

1957-58

PARLIAMENT OF NEW SOUTH WALES

REPORT
OF THE
DEPARTMENT OF AGRICULTURE
NEW SOUTH WALES

FOR THE
Year ended 30th June, 1957

BY COMMAND

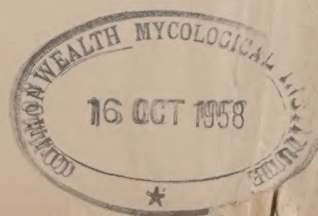
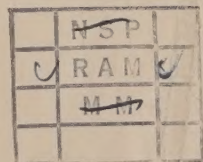
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REPORT

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AS AT 30th JUNE, 1957

DEPARTMENT OF AGRICULTURE*

Minister for Agriculture and Minister for Food Production	Hon. E. H. GRAHAM, M.L.A.
Under Secretary and Director	Dr. R. J. NOBLE.
Assistant Under Secretary	Mr. E. O. TOUT.
Assistant Director of Agriculture	Dr. H. J. HYNES.

Central Administration—

Accountant	F. L. HEDGES.
Chief Clerk.....	C. W. WEARNE.
Personnel Officer	P. S. HILL.
Pastures Protection Officer	S. W. WISE.
Legal Officer	J. L. HAGER.
Architect	H. A. BROWNE.
Biometrician	F. C. MCCLEERY.
Acting Chief, Experiment Stations and Farms.....	A. PEARSON.

Division of Plant Industry—

Chief	W. H. G. POGGENDORFF.
Deputy Chief	A. C. ORMAN.
Principal Agronomist (Pastures)	C. K. VEARS.
Principal Agronomist (Research)	Dr. S. L. MACINDOE.
Principal Agronomist (Extension)	G. NICHOLSON.

Division of Horticulture—

Chief	Dr. F. T. BOWMAN.
Deputy Chief.....	H. W. EASTWOOD.
Principal Fruit Officer (Extension)	J. A. BALLANTYNE.
Principal Fruit Officer (Research)	B. O. FRENCH.
Senior Inspector (Export and Import Branch).....	L. T. BILBE.

Division of Animal Industry—

Chief	C. C. BLUMER.
Deputy Chief.....	R. M. WATTS.
Director of Veterinary Research	G. EDGAR.
Principal Veterinary Research Officer	J. C. KEAST.
Chairman, Board of Tick Control, Lismore	J. N. HENRY.
Principal Veterinary Officer	N. K. GOLDING.
Principal Veterinary Officer (Meat Inspection)	R. A. HALL.
Principal Livestock Officer (Sheep and Wool)	A. K. CANTRILL.
Principal Livestock Officer (Horses, Cattle and Goats)	W. J. B. MURPHY.
Principal Livestock Officer (Pigs).....	G. M. D. CARSE.
Principal Livestock Officer (Poultry)	V. H. M. BRANN.
Principal Livestock Officer (Apiculture)	A. A. CLEMSON.

Division of Dairying—

Chief	G. MCGILLIVRAY.
Deputy Chief.....	A. C. SMALL.
Principal Dairy Officer	J. D. L. MCGIBBON
Principal Dairy Officer (Herd Improvement)	I. W. SCOTT.

Division of Science Services—

Chief	Dr. R. J. NOBLE.
Chief Biologist	Dr. C. J. P. MAGEE.
Chief Entomologist	S. L. ALLMAN.
Chief Chemist	T. H. JOHNS.
Chief Botanist and Curator, Botanic Gardens and National Herbarium	R. H. ANDERSON.

As at 30th June, 1957

Department of Agriculture—*continued*.

Division of Information Services—

Chief	H. PARRY BROWN.
Editor of Publications	R. J. K. SYNNOTT.
Organiser, Agricultural Bureau	J. J. SLATER.
Senior Extension Officer (Women's Service)	Miss N. M. FOSKETT.

Division of Marketing and Agricultural Economics—

Chief	C. J. KING.
Principal Economics Research Officer	P. C. DRUCE.

Division of Regional Extension Services—

Acting Chief	J. L. GREEN.
Regional Supervisors—	
Southern Region	R. C. MADSEN.
Far North Coast Region	S. R. BALLARD.
Western Region	B. D. AMENT.
South Coast and Tablelands	R. W. SHELLEY.
South Western Region	G. A. CRAWFORD.
Northern Region	R. D. EASTOE.
Mid-Coast and Hunter Region	D. W. CROWFOOT.

Hawkesbury Agricultural College—

Principal	H. R. RICHARDSON.
Deputy Principal	A. JOHNSON.
Farm Supervisor	F. C. MORRIS.

Wagga Agricultural College and Experiment Station—

Principal	B. DOMAN.
Farm Supervisor	J. G. BALLANTYNE.

Wagga Agricultural Research Institute—

Director	Dr. A. T. PUGSLEY.
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Experiment Farms and Stations—

Bathurst Experiment Farm ...	Manager	J. A. HOLBECH.
Condobolin Experiment Farm	Manager	H. A. W. WOODWARD.
Cowra Experiment Farm	Manager	J. M. ARTHUR.
Glenfield Veterinary Research Station	Director	G. EDGAR.
Gosford Citrus Experiment Station	Officer-in-Charge	L. F. MANDELSON.
Grafton Experiment Farm ...	Manager	C. E. COLLINS.
Griffith Viticultural Nursery...	Superintendent	A. C. CLIFTON.
Leeton Experiment Farm	Manager	C. R. HOOD.
Lower Murray Research Station, Dareton	Officer-in-Charge	F. S. OLDHAM.
New England Experiment Farm	Manager	E. C. POWELL.
Poultry Experiment Station, Seven Hills	Manager	D. C. DUNCAN.
Tamworth Agricultural Experiment Station	Officer-in-Charge	J. A. LOVERIDGE.
Temora Experiment Farm ...	Manager	F. D. MACKENZIE
Trangie Agricultural Experiment Station	Manager	J. H. BALLARD.
Wollongbar Experiment Farm	Manager	W. J. C. HUDSON.
Yanco Experiment Farm	Manager	R. J. FLYNN.

* For details of staff of the various Divisions and Branches see New South Wales Department of Agriculture brochure "Directory of Officers".

For Staff number totals see tabulation in this Report, Page 18.

1957

NEW SOUTH WALES

DEPARTMENT OF AGRICULTURE

Report of the Under Secretary and Director to the Minister for Agriculture and Minister for Food Production for the Year ended 30th June, 1957

Department of Agriculture,
Sydney, 1958.

Food Production Policy

Dear Sir,

Herewith my Report of the Department of Agriculture for the year ended 30th June, 1957.

Production Trends

New South Wales wool production in 1956-57 increased substantially and was a record. The output of most other rural industries declined, due in part to excessively wet conditions in the early part of 1956 and later to a prolonged dry spell, particularly during the summer and autumn of 1957. Sheep numbers reached a record level in 1957. Beef cattle and pig numbers also rose.

Rainfall in most districts was below normal throughout the greater part of 1956-57. These dry conditions followed an excessively wet period during the first half of 1956. By autumn of 1957 conditions were becoming serious and the dry spell was relieved only temporarily by some general rain in June. Pastures and water supplies deteriorated steadily and the position was aggravated by high stocking rates on most properties.

Wheat production in the 1956-57 season was only half that of the previous year, as wet weather prevented adequate soil preparation. Furthermore, the 1957-58 crop will be one of the poorest on record because of the dry conditions and heavy grazing by stock.

Oat production was only about 40 per cent. of the previous year, and 1957 sowings were seriously curtailed by the dry weather.

Maize output was about the same as in 1955-56. Production of other cereal crops was lower than in the previous year. Although the acreage planted to rice in 1956-57 increased, total yield declined.

Sheep numbers reached the record figure of almost 68 million, an increase of approximately 7 per cent. over the previous year. Wool production totalling 660 million lb. greasy was also a record. The dry weather during early 1957 did not greatly affect the condition of sheep and no serious losses were reported. However, continuation of adverse weather will affect wool cuts and possibly prevent mating for the autumn drop.

Cattle numbers reached the record figure of almost 4 million head. The number of dairy animals in registered dairies declined slightly; beef cattle numbers rose sharply. Cattle were being affected by the dry spell, but no heavy mortalities have occurred.

Butter production fell during 1956-57, but the output of cheese increased. Egg production remained about the same. The output of other livestock industries varied little from the previous year's levels.

Citrus production increased slightly, but the output of all pome and stone fruits declined markedly. Furthermore, the continuation of dry weather is showing the extent of injury suffered by trees during the excessive wet weather of the first half of 1956.

Supply of farm machinery improved, and was accompanied by some easing of demand. Availability of farm materials and general requisites also improved, but there is still a shortage of Australian-made steel fencing posts.

Although protein feeds were more readily available, periodic shortages occurred throughout the year, particularly of meat meal.

New South Wales again co-operated with the governments of the Commonwealth and other States through the Australian Agricultural Council and the Standing Committee on Agriculture with a view to the selective expansion of food and fibre production. As in recent years, particular attention was paid to those industries for which export prospects appear most favourable.

The production potential of most New South Wales rural industries continued to expand. The rate of development in the major industries remained fairly steady in contrast to the previous year, when some decline in the rate of farm development occurred. Improved economic conditions in the wool industry in particular tended to encourage an increased rate of expansion, but this was offset, to some extent, towards the latter part of the year by a prolonged spell of dry weather throughout most of the State. As in the previous year, restrictive credit policies also continued to hamper farm development to some extent. Despite representations by New South Wales for an Australian-wide assessment of the effect of these policies on rural production and development no action was taken, and restrictive credit policies remained unchanged.

Supply of almost all farm requisites and farm machinery continued to be adequate throughout the year. Some minor shortages of animal feedstuffs, particularly high protein feeds, were reported from time to time. The only major item of equipment which remained in seriously short supply was steel fencing posts. However, it is anticipated that planned expansion in production will result in this shortage being overcome during the coming year. The cost of farm requisites and supplies generally rose slightly during the year.

In contrast to 1955-56 there was a marked improvement in wool prices. Wheat export prices also improved slightly. Average wool realisations increased by almost 30 per cent. by comparison with the previous season, with a resultant beneficial effect on the rural economy generally. On the other hand, average export prices for beef and lamb showed a further decline, but there was a slight improvement in export realisations for mutton. Export markets for most other commodities remained reasonably stable during the year, but considerable difficulty was experienced in disposing of eggs and egg products on the United Kingdom market owing to a substantial increase in local production of eggs.

Australian Agricultural Council and Standing Committee on Agriculture

Two meetings of the Australian Agricultural Council were held, at Canberra in August, 1956, and at Sydney in February, 1957. Two meetings of the Standing Committee on Agriculture were held, at Canberra in July, 1956, and at Sydney in February, 1957.

Two of the more important items considered at the meetings were wheat research and fruit fly. Certain administrative procedures for the operation of the wheat research plan were recommended for consideration by the Commonwealth Government. The Commonwealth subsequently brought down legislation providing for a levy on growers to finance research, and a Wheat Industry Research Council and State Advisory Committee were established.

A three-year programme of fruit fly investigations was commenced, financed by contributions from the Commonwealth (quarter), the Federal Citrus Council (quarter) and New South Wales, Victoria and South Australia (one-sixth each). These investigations are concentrated on the testing of methods

of fruit treatment designed to kill the fruit fly without affecting the quality of the fruit. At the February, 1957, meeting it was recommended that, in view of the increasing spread and menace of the fruit fly, the Commonwealth Government should assist, on a £ for £ basis, those States which engaged in campaigns for the prevention of the spread and eradication of fruit fly in Australia.

Food and Agriculture Organisation

The State F.A.O. Committee continued to maintain close liaison with the National F.A.O. Committee and, through that Committee, with the headquarters of the United Nations Food and Agriculture Organisation in Rome.

The State F.A.O. Committee and the Department continued to support F.A.O.'s Expanded Programme of Technical Assistance to underdeveloped countries, and several Departmental and retired officers were active in the programme. The Department also assisted in training agricultural students and government officers from various Asian countries.

Expenditure—Summary

Payments from Consolidated Revenue Fund relating to investigational, educational and associated administrative activities totalled £2,015,168. However, receipts from sales of farm produce, fees and other miscellaneous revenue, totalling £546,699, reduced the net cost of these services to £1,468,469.

Cattle tick eradication and control cost £1,249,039 (net) after allowing for stock dipping fees and other minor items of revenue totalling £8,382. The Commonwealth Government contributed £675,000 to help defray the costs of the campaign, leaving £574,039 to be borne by New South Wales.

The Botanic Gardens and Allied Activities accounted for a further sum of £107,960, offset by receipts totalling £10,317, leaving a net cost to the Consolidated Revenue Fund of £97,643.

In addition, buildings and improvements of a permanent nature, at a total cost of £114,963, were constructed during the year, the money being provided by the Treasury from Loan Funds.

Details of the accounts of the Department, including numerous Special Deposits Accounts, opened with the Treasury in terms of the Special Deposits Act of 1911, are presented in the Appendix I.

Capital Works

The Department has in hand capital works, such as buildings, water supply, stock yards, etc., estimated to cost £80,000. In addition to the works in hand, many improvements (buildings, water supply, fencing, etc.) are essential at Experiment Farms and Stations and at the Agricultural Colleges if the Department is to carry out those research and educational projects so necessary to the development of the primary industries.

Farrer Memorial Trust

The trustees of the Farrer Memorial Research Scholarship Fund held an annual and an ordinary meeting.

The Annual Farrer Memorial Oration was delivered by Mr. A. F. Bell, B.Sc., M.S.(Agr.), D.I.C., A.R.A.C.I., Under Secretary of the Queensland Department of Agriculture and Stock, on the occasion of the Annual State Congress of the Agricultural Bureau of New South Wales at Hawkesbury Agricultural College. Mr. Bell was presented, on behalf of the trustees, with the Farrer Memorial Medal for 1956 in recognition of his distinguished service in agricultural science. The subject of the Oration was "Science Services for Primary Industry" and the text was subsequently published in *The Agricultural Gazette of N.S.W.*

The Farrer Scholar, Mr. W. V. Single, B.Sc.Agr.(Syd.), was still in the United Kingdom as at 30th June, 1957, carrying out post-graduate research into frost damage in wheat. The scholarship was awarded in August, 1955, and will continue until August, 1957. Mr. Single is an officer of the Department.

Reports indicate that the results of Mr. Single's investigations will be of considerable interest, and the experience and training gained overseas will be of great benefit to the Department.

Botanic Gardens and Sydney Domain Trust

The trustees of the Botanic Gardens and the Sydney Domain met once during the year.

Requests continued to be received for the alienation of portions of the Domain for purposes other than those relating to the full and free use of the Domain by the public. Work is proceeding on the construction by the City Council of a car parking station in the Domain and on the construction of the express roadway from Circular Quay, which will affect part of the Domain.

Mr. G. M. Gray, Under Secretary, Premier's Department, was appointed a trustee vice Mr. P. H. Roper, deceased.

McGarvie Smith Institute

A large range of vaccines is produced at the McGarvie Smith Institute. Many of the vaccines are sold for use overseas.

In accordance with the McGarvie Smith Institute Incorporation Act, 1928, profits from the sale of vaccines are applied to the promotion and advancement of veterinary education and research. The financial position of the Institute is satisfactory.

Regional Extension Services

A new Division, known as the Division of Regional Extension Services, was established on 23rd April, 1957. This Division administers the regional extension services, attends to matters pertaining to Agricultural Regions generally and to funds provided by the Commonwealth for agricultural extension purposes.

At the time of its establishment, the staff of the Division consisted of a Chief (Mr. John L. Green, Acting), Regional Supervisors of Agriculture, Regional Publicity Officers, the Italian Liaison Officer, and Field Assistants employed under the various Commonwealth Extension Grants.

Detail of the Regional Extension Services is provided later in this report, under "Division of Regional Extension Services".

Co-ordinated Extension Services

The Co-ordinated Extension Services scheme, inaugurated by the New South Wales Food Production Committee in 1952, continued to operate. Officers of the Department of Agriculture, the Soil Conservation Service, the Rural Bank of New South Wales and the N.S.W. Milk Board by this means co-operate in providing advisory services for primary producers. Regional Supervisors and District Agronomists of the Department of Agriculture are the co-ordinators in various districts.

Milk Zone Production Advisory Council.—This Council, established by the N.S.W. Milk Board to assist the Co-ordinated Extension Services scheme, has, amongst other achievements, twenty-five production advisory committees in the whole milk zone. These committees co-operated with Department of Agriculture and Milk Board officers in organising field days, film evenings and similar meetings of farmers.

Agricultural Extension Grant

The Commonwealth Agricultural Extension Grant was instituted in 1952 to assist the states to develop and extend their agricultural colleges and universities.

Further details of this Grant are mentioned in appropriate sections of this report.

Dairy Industry Extension Grant

The allocation to New South Wales under the Commonwealth's Dairy Industry Extension Grant for 1956-57 was £64,879, which, with unspent funds from the previous financial year, made £77,223 15s. 1d. available. Approved expenditure headings included: Grade Herd Recordings, Sire Survey and Herd Wastage, Farm Demonstrations, Salaries and Expenses of Organising Officers, General Publicity including the bi-monthly periodical "Dairy Topics", Punch Card Equipment, Survey of Efficiency of Milking Machines, Survey of Sterility in Dairy Cattle, Testing Station (H.A.C.) for Air Flow Meters, etc., and temporary staff engaged on statistical work.

There are more details of the Grant later in this report.

Country Killing

The Gunnedah abattoir, the last of the series of four large-scale killing works constructed under Government sponsorship, commenced operations on 26th June, 1957. This follows the completion of the Goulburn abattoir in May, 1951, the Wagga Wagga abattoir in December, 1951, and the Dubbo abattoir in August, 1954.

Homebush Abattoir

The new country meat market at Homebush abattoir was opened in May, 1957, but does not come into operation until July, 1957.

This building was erected to enable the effective handling of carcasses brought into the metropolitan area from country abattoirs, so that country-killed meat will have the same advantages of display for buyers as that slaughtered in Sydney.

Meat Inspection Service

The Meat Inspection Service continued to fulfil its main function, viz., inspection to ensure disease-free meat for the Sydney metropolitan area.

The co-operation scheme as between Commonwealth and State which began in February, 1955, was continued throughout the year. For the first time since the inception of this scheme, the Commonwealth Inspection Service made use of State Inspectors to assist in the beef unit during short runs of export cattle.

Detail of the Meat Inspection Service is provided later in this report under "Division of Animal Industry".

Cattle Tick Eradication

The Tick Eradication Campaign commenced in January, 1956, and the main dipping programme was completed in March, 1957. From 1st July, 1956, onwards over 3,750,000 cattle were dipped or sprayed as well as over 148,000 horses and 6,000 sheep and goats.

On completion of the dipping phase, a programme of inspections at twenty-one day intervals was put into operation. Three rounds in inspection were completed by 16th June, 1957, and two infestations were detected in the Kyogle area, one in the third round and the other during the early stages of the fourth round.

Following detection of tick infestations in the Boonoo Boonoo area, preparations were made for the necessary eradication campaign. Areas where the nature of the country rendered the complete muster of all stock impracticable were assessed by the Department. The total area leased was 138,155 acres, on sixty-four holdings, at a cost of £80,843. The dipping programme commenced on 3rd June, 1957, in this area.

Nine new dips were constructed in the Tick Quarantine areas and one on the Queensland border; one other, privately owned, was taken over.

The work of the Board of Tick Control is reported in detail under "Division of Animal Industry".

Rabbits

The rabbit population remained at a low level.

There is evidence, however, that myxomatosis was not as effective this year as previously. This is attributed largely to the dry season and the absence of surface water suitable as breeding areas for mosquitoes, the main vector of the disease. Furthermore, some rabbits were found to be resistant to myxomatosis.

The standard laboratory strain of virus was maintained at high virulence. Glenfield Veterinary Research Station distributed 200,200 doses during the year, compared with 188,000 in 1955-56.

Further details appear later in this report under "Pastures Protection Section" and "Division of Animal Industry".

Poultry Industry Efficiency

The Poultry Improvement Plan, which is designed to improve the genotype of Australian strains of poultry, is continuing satisfactorily. Sixteen accredited breeders are co-operating in the scheme, and this is adequate to meet the industry's need for pedigreed stock.

Pullets will be submitted by the approved breeders to Hawkesbury Agricultural College in August, 1957, for Random Sample Testing now that plant and equipment are available.

Swine Compensation Fund

The Swine Compensation Fund set up under the Swine Compensation Act, 1928-1935, continues to be in a satisfactory financial position. The operation of the Swine Branding Act, 1940, helped to improve the Fund finances. The balance in the Fund as at 30th June, 1957, was £55,060.

Royal Easter Show—Livestock Successes

Livestock from Departmental studs exhibited at the N.S.W. Royal Agricultural Society's 1957 show again were successful in winning a number of awards.

Championships were taken by the Arab stallion "Razaz" (for the second year in succession), the Friesian Bull "Sniders Fond Hope King", and by the Guernsey Bull "Champion of Friquet de Haut", all of which were purchased by the last overseas stud stock buying delegation. The mare "Dione" from Wagga Agricultural College was reserve champion Arab mare.

Fodder Conservation

During the spring, conditions were ideal for conserving excess growth as silage or hay. Although more than the usual amount of pasture silage was made it was not sufficient to meet requirements during even a moderate drought. The question of fodder conservation needs to be extensively surveyed so that a worthwhile programme can be formulated and implemented.

School of Dairy Technology at Hawkesbury Agricultural College

This school is now in full operation. Nineteen students entered the first year of the course in 1957, this being the largest number ever to commence in any year of the course. Eight students, including the first two under the Dairy Apprenticeship Scholarship Scheme, completed the course at the end of 1956.

Fruit Fly Outbreak

A heavy infestation of Queensland fruit fly occurred at Corowa on the Murray River, and another heavy, though limited, infestation at Hillston. A further small infestation was discovered at Mildura. This, together with the Corowa infestation and a small occurrence at Ganmain, restricted export to New Zealand of citrus fruits from the upper and lower Murray districts and from the Leeton end of the Murrumbidgee Irrigation Areas.

The fruit fly eradication campaign carried out in the M.I.A. was successful; no flies were caught within this area since June, 1956. Measures are being taken in the Corowa district to eradicate the fly.

Agricultural Education

Student enrolment at Hawkesbury Agricultural College was 233 at the beginning of the first session in February, 1957. Demand for enrolment continues to be heavy.

Wagga Agricultural College enrolment is still limited by available accommodation. Students enrolled at 1st July, 1956, were 73, and 79 at the 1st July, 1957.

Short term schools were held at both Hawkesbury and Wagga Agricultural Colleges. Schools were conducted in Dairy Farming, Poultry Farming, Pig Raising, Tractor Maintenance, Beekeeping, Turkey Raising and Pasture and Animal Husbandry. Also schools were held for junior farmers and for second-year agriculture students of the University of Sydney.

The two Agricultural Colleges are reported in detail in a later section of this report.

Experiment Farms and Stations Branch

Education and Extension.—Field days covering all aspects of farming and grazing were held at experiment farms and drew large audiences.

Managers have used radio broadcasting extensively to bring the Department's work on experiment farms to the public.

A well-attended beef cattle extension school was held at Yanco Experiment Farm. Twenty-four visiting farmers were accommodated at the Farm during this five-day school.

A group of junior farmers sponsored by the Department of Education and the Junior Farmers' Movement was also in residence at Yanco Experiment Farm for a week.

A three-day pasture and animal nutrition school was held at Wollongbar Experiment Farm. Accommodation was not provided. Average daily attendance was 200 farmers.

Capital Improvements.—Considerable alterations and extensions have been made to farm buildings.

At Yanco Experiment Farm extensive alterations are being made to provide accommodation for visiting officers and other persons.

Alterations are also being made to house scientific and field staff investigating agricultural, horticultural and soil problems for the Murrumbidgee Irrigation Research and Extension Committee of the Irrigation Area.

Septic tanks have been installed at Temora and Leeton Experiment Farms and the Lower Murray Research Station. A workmen's amenities building and lunch-room have been erected at Condobolin Experiment Farm. A new machinery-shed has been erected at Yanco Experiment Farm.

A considerable amount of maintenance work has been carried out by the architect's and by experiment farms' staff on buildings and an extensive fencing programme has been carried out on all farms.

Maintenance work has been completed on buildings at Trangie, and approximately ten miles of new fences were erected during the year.

At Tamworth Agricultural Experiment Station, practically all subdividing fences have been completed in conformity with the overall soil conservation plan drawn up for this station.

The soil conservation work at New England Experiment Farm has also made it necessary to start re-arrangement of internal fencing, and good progress has been made.

At the Lower Murray Research Station, the section used for immediate experiment work has been completely netted, and horticultural and nursery work has begun there. Roadways into and within the station have been built and sealed by the Main Roads Department.

Sheep yards have been erected at Cowra Experiment Farm and at Tamworth Agricultural Experiment Station.

Fodder Conservation.—The policy of increased fodder conservation is bearing fruit. Although Trangie Experiment Station is in a border area for fodder production, it carries the greatest number of stock of any departmental farm; the Aberdeen Angus stud herd is stationed there, also a flock of some 4,500 Merino sheep. Though some natural pasture is available, supplementary feed is always required for the Aberdeen Angus stud. The Merinos, which are used for experiment work, also consume much conserved fodder. Stock feed bought for Trangie Experiment Station last year cost only a small fraction of the outlay for purchased fodder two years ago, and was limited to protein concentrates and similar feed stuffs which the Department cannot produce.

A similar departmental saving arose from the transfer of considerable quantities of fodder to Seven Hills Poultry Experiment Station and Hawkesbury Agricultural College.

In spite of the very dry conditions, which have depleted conserved fodder on experiment farms, the following departmental stocks were still available at 30th June, 1957: 547 tons baled wheaten hay, 110 tons baled oaten hay, 1,600 tons baled lucerne and pasture hay, 1,100 tons silage, 20,000 bushels oats, 4,000 bushels wheat, 1,000 bushels barley, 2,700 bushels maize.

These stocks offer no complete insurance against prolonged drought, but given favourable circumstances, they will be built up to ensure such protection.

New Experiment Farms.—Irrigation water should be available from the Keepit Dam when it is completed in four or five years. An area of 204 acres in the Narrabri-Wee Waa district is being developed to compile information on irrigation practices and the agricultural potential of irrigated land in north-western areas.

Machinery.—Funds were inadequate for the machinery replacements and additions needed on sixteen experiment farms and stations. Main purchases were a Fordson tractor for Leeton Experiment Farm, a Ferguson tractor for Wollongbar Experiment Farm, a Hannaford grader for Temora Experiment Farm and irrigation equipment for Yanco Experiment Farm.

General.—Lack of sufficient money to cover development, maintenance and necessary replacements of buildings and fixed capital assets, machinery and plant, prevents experiment farms from operating at their fullest potential. However, best possible use was made of the funds available, every effort has been made to economise, and progress generally has been excellent.

Weeds

Wet weather encouraged heavy growth of such weeds as thistles, Bathurst burr, broomrape, etc.

Six regional weeds conferences were convened dealing with eastern and central New South Wales. A special conference on serrated tussock control was also held.

Wheat

A most unfavourable season resulted in the smallest wheat harvest since the disastrous 1946-47 season. Excessive late summer and winter rains greatly reduced the area sown and the final yield. However, favourable conditions at harvest time produced a good grain sample.

Total production was approximately 28,000,000 bushels from 1,713,000 acres (16.3 bushels per acre). Last year's production was 57.1 million bushels from 2,937,000 acres (19.4 bushels per acre).

Pasture Research

Sowings of improved pastures increased largely because of new knowledge gained by research workers. Successful pasture establishment was achieved on a number of soil types previously recognised as "problem" soils. Plant nutrition investigations were continued, and nitrogen research programmes were commenced.

Cattle Compensation Act, 1951-1956

Under amending legislation which was assented to on 9th November, 1956, every Pastures Protection Board is required to levy a special rate, in respect of cattle, on occupiers of land and on owners of cattle who are not occupiers of land. The rate is 1s. per head.

During the financial year 1956-57, claims passed for payment totalled 6,069, covering 12,086 head of cattle. Compensation paid amounted to £215,830. The fund had a credit balance of £24,157 at 30th June, 1957, of which £15,000 was advanced by the Treasury.

Argentine Ants

Twenty-eight new areas of infestation were discovered during the year, bringing the total known area of infestation up to about 2,800 acres. The total area sprayed since the campaign began is 2,686 acres. Spray materials used totalled 19,931 gallons, and the total cost since the inception of the campaign is £58,390.

Mushroom Culture

The cultivated-mushroom industry in New South Wales continued to expand, particularly in the Sydney metropolitan area and the near tablelands. The annual value of the product is now approximately £500,000.

Animal Diseases

The dry spell helped to control internal parasites of sheep, and greatly improved the clinical position of footrot, foot abscess and scald. On the other hand, conditions made the incidence of pregnancy toxæmia more widespread than usual.

The year was notable for an extensive outbreak of pleuro pneumonia, for an increase in incidence of trichomoniasis and leptospirosis in dairy cattle, for avian monocytosis and for the subsidence of the ephemeral fever epizootic which was so spectacular during last year.

Legal and Registration Branch

ACTS PASSED

Marketing of Primary Products (Amendment) Act, 1956.—This Act removed certain limitations placed upon the extent of the operation of the regulation making provisions of the principal Act by a decision of the Supreme Court. Also it conferred certain additional trading powers on marketing boards, and validated a scheme of the Egg Marketing Board for financing the construction of its premises at Lidcombe.

Cattle Compensation (Amendment) Act, 1956, and Cattle Compensation Taxation Act, 1956.—This legislation provided for a new means of raising revenue for the Cattle Compensation Fund. It replaced the tax upon the sale of cattle with an annual per capita rate levied and collected by pastures protection boards. In addition, provision was made for the levy of stamp duty at the rate of 1/- per head upon the delivery of cattle to an abattoir for slaughter.

Veterinary Surgeons (Amendment) Act, 1957.—This Act extended for a further ten years the special provisions of the 1952 legislation under which graduates of overseas veterinary schools not otherwise entitled to registration might qualify for registration by passing a prescribed examination conducted by the Department.

Border Railways (Grain Elevators) Amendment Act, 1957.—Statutory authority is given under this Act to the Grain Elevators Board of Victoria to erect and operate grain elevators at approved places along the border railways operated in New South Wales by the Victorian railway authorities.

Cattle Slaughtering and Diseased Animals and Meat (Amendments) Act.—A quarter sessions court ruling interpreted certain provisions of the Act dealing with the appointment by councils of central abattoirs. This rendered the provisions of the Act inoperative in the Cooma municipality, and special legislation became necessary to ensure that the provisions did operate in the municipality as originally intended.

REGULATIONS, PROCLAMATIONS

There were 19 gazettals of regulations, 54 proclamations and 51 notifications during the year.

The Stock (Artificial Insemination) Act was brought into operation and a set of regulations was published dealing with the licensing and conduct of artificial insemination centres and sub-centres.

Another important regulation was made under the Marketing of Primary Products Act, 1927-1956, to enable rice to pass direct from the producer to the growers' co-operative mill. The Rice Marketing Board acts as agent for the grower in negotiation with the mill.

PROSECUTIONS

During the year 220 persons were prosecuted for offences under the various Acts administered by the Department.

ARBITRATION—AGRICULTURAL HOLDINGS ACT, 1941

Five disputes were referred to arbitration under the Act. In four cases the tenant or sharefarmer claimed compensation from the landlord or owner for improvements effected by the former. In the other case compensation was claimed by the owner for deterioration of the holding by reason of the tenant's failure to operate the property in accordance with the rules of good husbandry.

In one case the Agricultural Committee sought the opinion of the district court on a question of law.

REGISTRATION

Registrations effected during 1956-57 compared with those of 1955-56 are tabulated below.

There is no variation which calls for particular comment. The fall in the number of swine brands and licences was to be expected, as it represents a tapering off of the initial onrush of registrations.

A supplementary large stock brands directory for the years 1954 and 1955 was printed and copies were despatched by the Government Printer during March and April, 1957.

Apiary registrations	3,853	3,756
Potato Licences	1,548	1,595
Stock Foods	896	920
Stock Medicines	1,347	1,494
Pest Destroyers	1,087	1,039
Sheep Brands	2,439	2,387
Sheep Earmarks	2,662	2,635
Large Stock Brands	2,005	2,039
Fertilizers	429	455
Farm Produce Agents	304	297
Veterinary Surgeons	374	385
Swine Brands	2,852	1,946
Swine Licences	269	73

Veterinary Surgeons Board

In view of the vacancy in the position of Registrar, the Board met on only six occasions during the year.

The prescribed examination for veterinary graduates of overseas universities was held in September, 1956. Two candidates were successful and subsequently were granted registration.

In April, 1957, the Veterinary Surgeons (Amendment) Act was passed extending for a further ten years the special provisions enabling graduates of overseas universities to be registered on passing the prescribed examination.

Personnel Section

Tutorial classes were arranged for clerical officers studying for examinations under Regulations 116 and 119.

Lectures and discussions in Supervision, organised by the Public Service Board through the Sydney Technical College, were attended by officers in the top and middle supervising brackets.

Cases of employee maladjustment were investigated and remedial action recommended. In some of these cases advantage was taken of the Public Service Board's counselling service, with highly satisfactory results. Officers discussed with members of the Personnel Section a wide variety of problems, ranging from purely official matters to ones of a personal nature. In most cases it was possible for the Section to provide assistance or to indicate where help might be obtained.

Traineeships tenable at universities and cadetships at Hawkesbury and Wagga Agricultural Colleges continued to attract the interest of High School students and of parents. Over 300 applications were received for the traineeships and cadetships available in 1957.

The Department continued to make training facilities available, both in Head Office and at country centres, for Fellows under the F.A.O. and Colombo Plans. Trainees were accepted from India, Pakistan, Ceylon, Malaya, The Philippines, Indonesia and Uruguay. Reports from Departmental officers indicate that, generally, the Fellows were enthusiastic, co-operative and well-fitted to undertake studies in their respective fields.

Staff Changes

Appointments.—Dr. F. T. Bowman, Chief, Division of Horticulture; Messrs. C. W. Wearne, Chief Clerk; R. C. Cramp, Assistant Principal Veterinary Officer; J. L. Green, Executive Officer, Regional Extension Services; A. Pearson, Chief, Experiment Farms and Stations; A. C. Orman, Deputy Chief, Division of Plant Industry; G. Nicholson, Principal Agronomist; R. D. Eastoe, Regional Supervisor, Tamworth; G. A. Crawford, Regional Supervisor, Leeton; J. K. Powrie, Research Officer; P. S. Hill, Minister's Secretary and Personnel Officer; D. W. Crowfoot, Regional Supervisor, Maitland.

Retirements.—Messrs. J. I. Marrott, Chief Clerk; L. Judd, Principal Agronomist; W. H. Broadfoot, Chief, Division of Horticulture; E. H. Zeck, Entomologist; W. R. Watkins, Agronomist.

Departed for overseas.—Mr. L. T. Bilbe, Senior Inspector, Export and Import Branch, to United Kingdom to assist the Commonwealth Fruit Officer; Mr. H. W. Lea, Agronomist, for the United States of America for research into tobacco disease and production problems.

Mr. G. C. McFarlane, Economics Research Officer, to United Kingdom to accept appointment as Assistant Agricultural Economist at the University of Bristol (on leave without pay).

Returned from overseas.—Dr. P. G. Valder, Plant Pathologist, from United Kingdom as a Ben Fuller Travelling Scholar.

Mr. A. E. Wilson, Landscape Gardener, from private visit studying landscape gardening.

Miss A. I. M. Meyers, Seeds Officer, from France and United Kingdom in connection with seed testing.

Dr. T. B. Kiely, Plant Pathologist, from Ceylon as adviser in citrus cultivation under the Colombo Plan.

Visited Overseas during the year.—Dr. C. J. Magee, Chief Biologist, visited the Philippines under arrangement with the Food and Agriculture Organisation to advise on control of abaca mosaic.

Staff at 30th June, 1956

	Public Service Board	Ministerial	Total
Central Administration	292	...	292
Division of Information and Regional Extension Services..	39	...	39
Division of Marketing and Agricultural Economics.....	29	...	29
Division of Science Services ...	94	...	94
Division of Plant Industry	179	...	179
Division of Dairying	162	...	162
Division of Horticulture	127	...	127
Division of Animal Industry—			
Head and District Offices	170	12	182
Meat Inspection Service ...	113	13	126
Queensland Border	42	...	42
Tick Quarantine Areas	36	729	765
Hawkesbury Agricultural College	52	73	125
Wagga Agricultural College	28	39	67
Experiment Farms and Nurseries	199	153	352
Botanic Gardens.....	120	3	123
	1,682	1,022	2,704

Architect Branch

The amount of Loan Funds and Consolidated Revenue Funds expended on new works and maintenance work during the year was as follows:—

Loan Funds £114,963

C. R. Funds and including Western Division Public Watering Places Fund 60,080

Works completed.—Bull sheds and yards at Hawkesbury Agricultural College; Research Institute, bull sheds and yards; oval at Wagga Agricultural College and Experiment Station; new garages at Yanco Experiment Farm; septic tank and hot water installation at Lower Murray Research Station; shearing shed at Shannon Vale; amenities hut at Condobolin Experiment Farm; Nu-Way maize drier at Grafton Experiment Farm.

Work Still Proceeding.—Dairy products factory at Hawkesbury Agricultural College; new administration building, stewards' and officers' quarters and dining room at Wagga Agricultural College and Experiment Station.

New Works Commenced.—Sewerage treatment plant and the connecting of cottages thereto at Wagga Agricultural College and Experiment Station.

Maintenance Work.—Painting and repairs to cottages and farm buildings at Trangie Agricultural Experiment Station, Leeton Experiment Farm, Yanco Experiment Farm, Condobolin Experiment Farm, Cowra Experiment Farm, New England Experiment Farm, Grafton Experiment Farm, Wollongbar Experiment Farm, and Queensland border control; desilting of tanks and maintenance of equipment on the Public Watering Places in the Western Division of the State.

Extension Service.—Many enquiries concerning building problems were attended to both by letter and personal interview. Plans of farm buildings to the value of £327,404 were supplied to farmers.

Pastures Protection Section

Grasshopper Control Campaign.—Since 1st July, 1956, there were no significant hatchings of plague locusts other than in the Lockhart, Urana and Corowa areas. These hatchings were not extensive and were in plague proportions for only one generation. Measures taken by local Pastures Protection Boards' officers and landholders were sufficient to deal with these infestations.

At the conclusion of the main grasshopper campaign a substantial amount of insecticide was on hand and all the equipment which had been purchased for the campaign. The insecticide was stored at various centres and is being offered for sale. Equipment also was stored, and as most of it is worn or obsolete it too is being offered for sale. A considerable quantity already has been disposed of.

A proposal for the training of Pastures Protection Board Rangers in grasshopper control technique was approved. The first training school will be conducted in August, 1957. This training will provide a nucleus of skilled officers spread throughout the central division of the State who was competent to instruct landholders and direct campaigns in their own districts when the next plague locust infestation occurs. This will be a much more satisfactory position than in 1953, when few Pastures Protection Board officers or landholders had any knowledge of modern methods of locust control.

Australian Plague Locust Trial Control Campaign.—In December, 1954, the Australian Agricultural Council authorised the carrying out of a trial campaign to test a new strategy for the control of the Australian Plague Locust.

Research over the past twenty years shows that locust outbreaks start in certain restricted areas of the western grazing country, from which swarms invade the agricultural regions. The idea behind the new strategy is to wage an intensive control campaign against the early swarms of an outbreak whilst they are still confined to those sources, or "outbreak" areas.

Management of the campaign is vested in a committee representing the New South Wales and Victorian Departments of Agriculture, and C.S.I.R.O.

The estimated cost of the campaign, £55,000, is being provided by New South Wales 40 per cent.; Commonwealth 30 per cent.; Victoria, South Australia, Queensland and Western Australia collectively 30 per cent.

The campaign will be carried out in what is known as the Bogan-Macquarie outbreak area, probably on the next occasion when swarming commences there. The Bogan-Macquarie area is bounded roughly by a line passing through Peak Hill, Trangie, Gulargambone, Coonamble, Carinda, west to the Bogan, south to Nyngan and back through Dandaloo to Peak Hill.

All costs will be borne by the control organisation, which will purchase spray equipment and insecticides, and hire motor transport and labour to operate the spray machines under trained direction.

A locust patrol officer was appointed in 1955 to serve as the nucleus of an intelligence service to locate the swarms to be treated. The patrol officer is based on Trangie and is at present conducting a systematic check on locust numbers, so that ample warning may be given of any tendency towards swarming.

In the light of the results from this trial, a determination will be made of the long-term policy to be adopted for plague locust control.

In May, 1957, representatives of this Department and C.S.I.R.O. made a detailed inspection of the outbreak area, following which consideration is being given to detailed plans for conducting the campaign.

The actual control work will be carried out by this Department, which, over a long period, has accumulated a great deal of knowledge of and extensive facilities for this type of work.

Rabbits.—With the drying off of grass and herbage and in many places its gradual disappearance, there is now a great deal less ground cover over most of the State and rabbit infestation is becoming more apparent. Because warrens and burrows and even rabbits could not easily be seen in the long grass, most landholders were of the opinion that they had few rabbits on their properties, but in many cases this proved to be wrong.

Myxomatosis was not as effective during the past autumn as previously, and this is probably due to the dry season with few mosquitoes or other suitable carriers of the disease.

It is very noticeable in most country areas that portable chillers are again in business around country towns, and freezing works are taking in larger numbers of rabbits.

The quick build-up in rabbit numbers over the past six or twelve months makes it apparent that landholders have been lulled into a false sense of security by the effectiveness of myxomatosis in past years. Most landholders are apathetic towards use of the standard methods of eradication.

Dingoes.—In September, 1956, a meeting of two representatives and a secretary from each of the Dingo Destruction Boards in the State was held in Sydney. This meeting was called at the request of the Lower North Coast and Tablelands Dingo Destruction Board and was held to discuss the effectiveness of present control methods and to examine new or improved methods to deal with the dingo.

Few suggestions of a constructive nature were put forward by the meeting. Aerial baiting was discussed at length. The Central Tablelands and Hunter Dingo Destruction Board has since carried out an aerial baiting test, and the Lower North Coast and Tablelands Board has decided that a further test should be made over an area within their district.

A large portion of the expenditure of Dingo Destruction Boards is on bonuses for scalps. There is a considerable difference of opinion as to whether the scalp bonus system has any effect on the control of dingoes. The number of scalps taken in most districts has remained fairly constant over many years and it appears that doggers are taking off a harvest of scalps, or, in other words, dingo farming.

Travelling Stock Reserves.—Since 1st July, 1956, inspection of Reserves was made in the following districts: Mudgee, Coonabarabran, Molong, Carcoar, Gundagai, Wagga, Bombala, Dubbo, Narrandera, Young and Coonamble.

The greatest number of Reserves awaiting inspection was at 1st July, 1956, when 643 cases were outstanding. At 30th June, 1957, this number was reduced to approximately 500.

Since appointment of a Field Officer in October, 1953, approximately 700 Reserves have been inspected. In 32 districts the inspections covered the whole of the Reserves at that time awaiting inspection. In four other districts practically all Reserves awaiting inspection were completed. Twelve districts still await inspection.

The following table shows the number of applications for Reserves received, rejected and investigated in each year since 1953:—

Year ending 30th June	Applications Received	Applications Rejected by Boards	Investigated
1953	614	239	17
1954	540	288	156
1955	461	221	122
1956	339	148	144
1957	487	216	283

A very large number of applications for Reserves was received immediately after the amendment of the Act in 1951. The grasshopper control campaign in 1954, 1955 and 1956 caused a lag in dealing with the Reserves, and applications fell away until there were only 339 in the year ended 30th June, 1956. It is noticeable, however, that after inspections are carried out in a district, and there are reports of areas being withdrawn, the number of applications increases. The increases to 478 shown to 30th June, 1957, is probably due to the fact that withdrawals have been made in many districts during the last year.

During the last twelve months travelling stock numbers have greatly increased on routes throughout the western and central western areas. The amount of agistment on routes has also greatly increased, as landholders who are overstocked on their own properties take advantage of the feed available on the "long paddock".

The Pastures Protection (Amendment) Act, 1951, included a provision enabling Travelling Stock Reserves in whole or in part to be withdrawn from the control of Pastures Protection Boards on the recommendation of the Minister for Agriculture. Applications for revocations of parts or the whole of Travelling Stock Reserves dealt with from 7th December, 1951, to 30th June, 1956, totalled 2,161, and during the past

year a further 478 applications were dealt with. Cases dealt with up to 30th June, 1957, and acreage involved are as follows:—

	Reserves	Acreage
1. Recommended for withdrawal with consent of Pastures Protection Boards	1,468	102,266 (i)
2. Recommended for withdrawal without consent of Boards	223	29,729 (ii)
3. Referred to Land Board by Minister, for inquiry, but not yet completed	6	487 (iii)
4. Referred to Land Board by Minister, for inquiry— (a) Land Board recommended part revocation (b) Land Board recommended against revocation	5 1	604 12
5. Boards not agreeable to revocation— (a) Investigation upheld Boards' decisions..... (b) Boards not agreeable, investigation not yet finalised	356 27	46,515 (iii) 3,886 (iv)
(c) Awaiting investigation	563	5,242 (v)
6. Awaiting replies from Boards as to whether or not they are agreeable to revocation	118	4,485
	2,767	193,226

(i) This figure excludes the unknown acreage of 262 Reserves.

(ii) This figure excludes the unknown acreage of 3 Reserves.

(iii) This figure excludes the unknown acreage of 45 Reserves.

(iv) This figure excludes the unknown acreage of 2 Reserves.

(v) This figure excludes the unknown acreage of 220 Reserves.

Re-organisation of Services of Stock Inspectors.—A committee consisting of the Accountant (Mr. F. L. Hedges); Chief, Division of Animal Industry (Mr. C. C. Blumer), and Pastures Protection Officer (Mr. S. Wise), with the subsequent addition of Mr. W. Cooke, Public Service Board Inspector, made recommendations to the Minister for re-organisation of the services of Stock Inspectors. This involved the amalgamation of a number of pastures protection districts so that the number of Boards in the eastern and central divisions would be reduced from 48 to 28, to each of which would be attached a Stock Inspector. It was proposed, further, that Stock Inspectors should be assisted in their duties by Rangers, who would relieve the Stock Inspectors of all duties other than those of a veterinary nature. Further, it was proposed that Stock Inspectors should be transferred from the control of Pastures Protection Boards to that of the Public Service Board.

Following discussions with the Council of Advice to Pastures Protection Boards, the Minister agreed that Pastures Protection Boards would not be transferred to the Public Service Board. Pastures Protection Boards agreed to the appointment of Rangers to assist Stock Inspectors so that they could confine their activities to veterinary work. The area then to be supervised by each Stock Inspector in their professional capacity would be extended in some cases to more than one pastures protection district. In this way a veterinary service would be provided throughout the entire State. The Western Division is already covered by the services of flying stock inspectors: one based on Bourke and one on Broken Hill.

The revised scheme took effect from 1st February, 1957, and is operating satisfactorily. Full benefit of the re-arrangement will not be realised until possibly twelve months after its inauguration.

Since 1st February, 1957 four additional Stock Inspectors were appointed, which permitted a reduction in the size of the area under the control of some already-employed Stock Inspectors.

Rangers.—Many Boards recommended to the Minister that their Rabbit Inspectors be appointed as Rangers and that they should continue to carry out the duties of Rabbit Inspectors. In most cases the Minister approved of these recommendations, but at the same time pointed out that the Boards in question must keep the rabbit position in their districts under constant review, and that they would be expected to take steps to appoint a Rabbit Inspector immediately the position warranted such an appointment.

It is proposed, at the end of September, 1957, to conduct a State-wide investigation of the rabbit position to determine whether Boards should be directed to employ Rabbit Inspectors where their Rangers are also carrying out the duties of Rabbit Inspectors.

Cattle Compensation.—Under the Cattle Compensation (Amendment) Act, 1956, a levy is being collected by Pastures Protection Boards for the Cattle Compensation Fund.

It is proposed that the Department pay an allowance to Pastures Protection Board Secretaries for the additional work undertaken in collection of this levy.

New Offices.—Many Pastures Protection Boards are erecting new offices and making improvements to their present premises. During the year, new offices have been constructed or are

in course of construction at Bathurst, Brewarrina, Jerilderie, Milparinka, Narrabri and Wanaaring. At Urana, a block of land has been purchased on which to build new premises, and at Deniliquin considerable improvements have been made to the Board's existing premises. At Coonabarabran a residence has been purchased for the secretary.

Legislation.—Arising out of re-organisation of these services of Stock Inspectors, the Pastures Protection Act, 1934-1956, is to be amended, principally for the purpose of transferring to Rangers the powers at present exercised under the Act by Stock Inspectors.

The amending legislation will also empower the Minister to direct Pastures Protection Boards to appoint Rangers. There is no reference to Rangers under the existing Act.

The Act at present provides that Boards *may* appoint Rabbit Inspectors. It will be amended to provide that Boards *may*, and where directed by the Minister *shall*, appoint Rabbit Inspectors.

The Act will also provide for an alteration in the title of "Stock Inspector" to "Veterinary Inspector", and for certain other machinery amendments.

Staff Statistics.—The following statistical data is furnished in respect of Stock Inspectors, Secretaries, Rabbit Inspectors and Rangers:—

Staff Statistics—Pastures Protection Boards

Number	Year ended	
	30th June, 1956	30th June, 1957
Stock Inspectors—		
Appointed	3 (inc. 2 acting)	5
Transferred	6	4
Resigned	1	3 (inc. 2 acting)
Retired	4 (inc. 3 acting)	1
Died	Nil	1 (acting)
Secretaries—		
Appointed	10	8
Resigned	6	4
Retired	1	2
Dismissed	1	Nil
Died	1	Nil
Rabbit Inspector—		
Appointed	4	9
Resigned	5	1
Retired	1	1
Died	Nil	1
Appointed as Ranger ...	Nil	38
Rangers—		
Appointed	Nil	57
Number of licences issued to keep fur bearing rabbits	18	18

Biometrical Branch

This branch provides advice to other sections of the Department on the design of experiments before investigational work is undertaken. When experiments are concluded, the Biometrical Branch carries out critical mathematical-statistical tests to assess the significance, or reliability, of the conclusions to be derived from them. Work of this kind was done during the year for numerous projects mentioned elsewhere in this report.

Punch-card Unit.—This unit was established at the beginning of 1956 with a staff of six machine operators to handle the office records from the Division of Dairying's Herd Recording Scheme. A monthly record of milk, test and fat is made throughout the lactations of some 60,000 cows tested each year.

Four major pieces of Hollerith punch-card equipment were delivered early in the year; namely, programme board punch and verifier, junior rolling total tabulator and reproducer summary punch. A substitute sorter with counting attachment was rented pending delivery of the permanent high-speed sorter.

The annual herd summaries and annual district summaries of group herd recording for the 1955-56 financial year were produced from punched cards during 1956-57. The punching of monthly records for individual cows for the current financial year was near completion at the end of June.

DIVISION OF PLANT INDUSTRY

Research Highlights.—Sowings of improved pastures increased, largely because of new knowledge gained by research workers. Successful pasture establishment has been achieved on a number of soil types previously recognised as "problem" soils. The use of lime in some cases was beneficial. A further refinement, now in commercial production, is lime pelleted seed—an alternative to the fifty-fifty lime-superphosphate mixture. That these pellets were under trial by the C.S.I.R.O. less than two years ago illustrates the rapidity with which research results are being made available to farmers. This is also a tribute to the co-operation among the Department of Agriculture, the C.S.I.R.O., the University of Sydney and the Coastal Pasture Research Committee.

Plant nutrition investigations in co-operation with the Chemists' Branch and the Chief Biologist have continued, and a new series of plots on problem soils have been established in the Bellingen area and at Gosford. These are closely linked with current pot investigations in the glasshouse at Hawkesbury Agricultural College.

Through the provision by Imperial Chemical Industries of £3,500 over three years, nitrogen research programmes have been commenced at Berry, Hawkesbury College, Gosford, Bellingen and Glen Innes.

Extension Activities.—The demand for the services of agronomists continues to increase, and this in the face of mounting staff problems. As a result, only a portion of this demand can be adequately met.

Publicity officers employed under the Agricultural Extension Grant have provided invaluable assistance to Agronomists in preparing material for publication, and publicising field days and meetings.

In addition to rendering extension advice, agronomists have certain regulatory duties to perform. These relate to pasture and crop certification, registered seed schemes, inspection of Government institutions, applications for assistance under the Farm Water Supplies Act, fire and flood relief, grasshopper control, the Agricultural Holdings Act and War Service Land Settlement inspections.

Land Settlement inspections were fewer and, fortunately, grasshopper numbers did not reach plague proportions. Although agronomists were relieved of actually judging local crop competitions, they tutored local judges in judging techniques. However, agronomists still judge pasture and fodder competitions, as these have a high extension value.

Agricultural Extension Grant.—An amount of £47,000 was allocated to this Division by the Commonwealth for the employment of Field Assistants, maintenance and running motor vehicles, and for conducting demonstrations. There are twenty-six projects relating to pastures, vegetables, field crops and weed control, allied demonstrations numbered some 500.

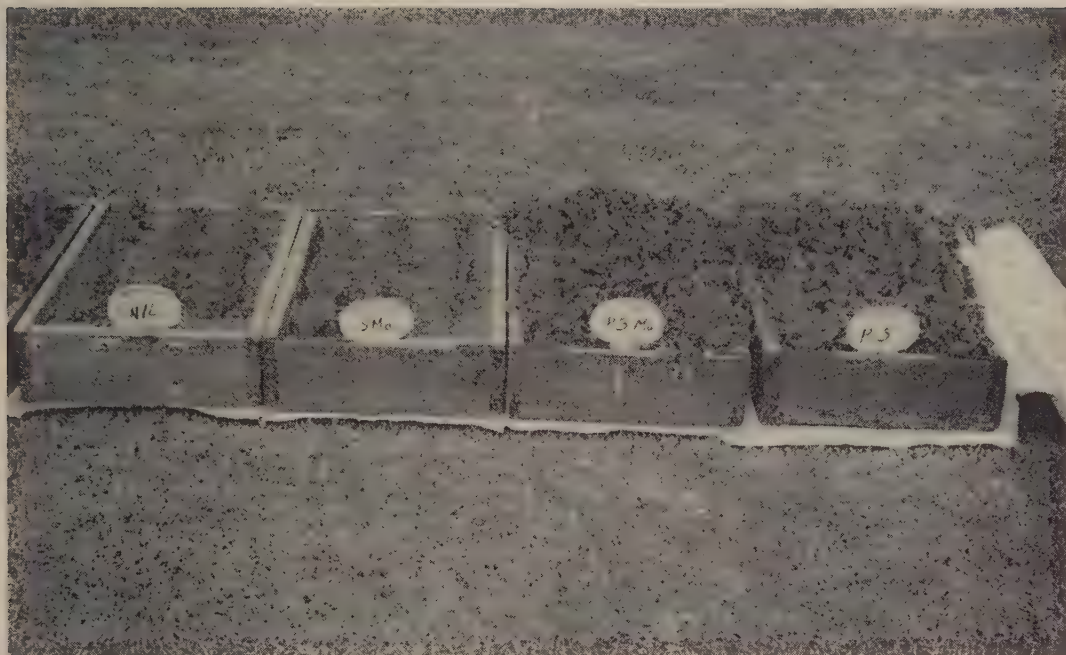
There are eighteen field assistants, an Italian liaison officer stationed in the M.I.A., and a farm hand, employed from Grant funds. Seventeen field assistants are provided with vehicles—while one field assistant and the Italian liaison officer have their own vehicles for which they receive a mileage allowance.

Field assistants have proved a great value to extension officers by assisting in conducting field demonstrations, and seed certification, and in operating extension aids equipment. They also perform routine duties, thus freeing agronomists for extension work.

The Italian liaison officer stationed at Griffith provides a valuable service conveying essential agricultural information to Italian settlers, many of whom do not speak English. Some 50 per cent. of the horticultural farms at Griffith are owned by farmers of Italian origin whilst a further 10 per cent. of farms are share-farmed or leased by Italians or persons of Italian origin.

Commonwealth Dairy Industry Extension Grant.—Funds from this Grant are used largely to demonstrate the value of improved pastures and conserved fodder, in the form of silage, as a means of increasing milk production. District Agronomists work with District Dairy Officers to conduct these demonstrations. Sixty-seven pasture demonstrations and thirteen on making silage, were commenced during the year.

Floods and Fires.—Dry conditions prevailed over much of the State until late June, when good relief rains fell. During the winter and spring of 1956 record floods occurred on the lower reaches of the Murray, Murrumbidgee and Darling Rivers and tributaries. Floodwaters took months to recede and services were disrupted.



Pasture Establishment Investigations

Legume inoculation, soil acidity and fertilizer requirements are some of the pasture establishment problems being investigated by the Department. Trials at Wa'cha showed the importance of both phosphorus and sulphur in pasture establishment in acid soil types.

(Photo. from Division of Plant Industry.)



Of Interest to Potato Growers

Considerable improvements in potato varieties and cultural methods have been achieved by research workers of the Department. A constant effort is being made to produce strains with greater yielding ability and increased disease resistance. Many seedlings for experiments are grown under glasshouse conditions.

(Photo. from New England Experiment Farm.)

Although the bushfire danger was extreme during the dry summer, most fires were quickly brought under control. Heaviest losses occurred in the Western Division and the Parkes district.

Where necessary, district agronomists assisted bushfire relief committees in providing help to landholders who had suffered loss from fires.

Grasshoppers.—Fortunately, the grasshopper situation has changed from one of intense activity to one of quiescence. Damage caused was negligible.

Fodder Conservation.—Regrettably, opportunities for conserving fodder during the past good seasons have not been taken. As a result, known reserves of fodder in this state are considered insufficient to meet requirements during even a moderate drought.

Last spring conditions were ideal for conserving excess growth as silage or hay. Due in part to the availability of suitable machinery, more than the usual amount of pasture silage was made, but it is still inadequate.

The question of fodder conservation needs to be extensively surveyed so a worthwhile programme, which is likely to be acceptable to stockowners, can be formulated.

Superphosphate.—Whereas less than two years ago demand for superphosphate exceeded supply, the position today is reversed. This is attributed to generally unfavourable seasonal conditions restricting its use. This year, the autumn was extremely dry and farmers confronted with the prospect of hand-feeding were loath to extend their topdressing programme. Furthermore, they had carried over fairly large stocks from the previous year. The carry-over is estimated at between 50,000 and 60,000 tons.

Sales of superphosphate in 1955-56 amounted to approximately 286,000 tons, whereas in 1956-57 the tonnage may have been 10,000 to 15,000 tons less.

Wheat

A most unfavourable season resulted in the smallest wheat harvest since the disastrous 1946-47 season. In all parts of the wheat belt, rainfall was well above average, particularly in the Central and Southern Divisions. Excessive late summer and winter rains greatly reduced the area sown and the final yield, particularly in the south of the State. However, favourable conditions at harvest time enabled production of a good grain sample.

Acreage and Production.—Total production was approximately 28,000,000 bushels from some 1,713,000 acres (i.e., 16.3 bushels per acre from the area sown). Last year's production was 57.1 million bushels from 2,937,000 acres sown, or 19.4 bushels per acre.

Demand for premium wheats, mainly from the north-west, was keen and premiums were higher than in the previous year. Individual bids reached 4s. 6d. per bushel. As at 1st March, 1957, 4,169,588 bushels were delivered to agents for a total premium of £334,522 or an average of 1s. 7.2d. per bushel. Varieties most in demand were Gabo, Festival Charter and Spica.

Fair Average Quality.—For the first time, separate F.A.Q. samples were declared. One, for the north, was a record, 64½ lb. and the other for the west and south combined was 64½ lb. The average protein content for the northern sample, which constituted approximately 40 per cent. of the total F.A.Q. receipts, was 10.03 per cent. and the average protein content for the combined western and southern sample (approximately 60 per cent. of total F.A.Q. deliveries) was 9.23 per cent.

Variety Popularity.—Statistics for 1955-56 which are the latest available, show the most popular varieties are:—Bencubbin 33.3 per cent., Gabo 20.3 per cent., Glenwari 6.3 per cent., Kendee 6.2 per cent., Festival 4.0 per cent., Ford 3.7 per cent., Bordan 3.1 per cent., Charter 2.8 per cent., Insignia 2.4 per cent. and Celebration 2.3 per cent. Bencubbin declined in popularity compared to the previous year, whilst Gabo, Glenwari and the Departmentally-bred Festival increased in popularity.

The rust resistant variety, Festival, was the outstanding strong flour variety at the Sydney Royal Easter Show for bench characteristics. Festival took high honours in last year's Queensland Championship Field Wheat Competitions, being placed first in each of the four competitions conducted.

Durum Wheat.—A new durum variety, Dural, was named. It was bred by the Department of Agriculture in co-operation with the North-West Plant Breeding Association and farmers

throughout the northern part of the State. The University of Sydney has co-operated in the testing of this strain over the last three years. Last year, farmers in the north-west planted some 200 acres of Dural and increased commercial sowings will be made this year. Dural is especially suitable for the production of high quality semolinas for the manufacture of spaghetti and macaroni.

Winter Wheats.—In the north-west of the State, the winter-wheat breeding programme, with the co-operation of the University of Sydney, advanced another important step with an application for naming of the winter-wheat hybrid G54/10. Field trials with this variety have indicated its superiority in grazing value, rust resistance, grain quality and yield over Winter Minflor. The new variety has the character of "winter-ness" which enables it to be sown very early and to withstand grazing without coming into head prematurely. The Department is expediting seed production of this new variety which, when available to farmers within a year or two is expected to replace existing winter-wheat varieties.

Biscuit Wheats.—The Department has co-operated with a leading biscuit manufacturer in beginning tests on wheats for biscuit manufacturing.

The trend towards greater production of better baking quality wheats and the build-up in soil fertility through wider use of legumes in the rotation was already having an effect upon availability of wheats especially suitable for biscuit manufacture.

Wheat Improvement.—The breeding programme at the Wagga Wagga Agricultural Research Institute, mainly to improve baking quality of southern wheat, continued.

In the north, the University-Department of Agriculture breeding programme is concentrated upon the development of rust-resistant lines of Eureka, Gabo, Kendee and Gular, some of which are now ready for observation. This work was complicated by the appearance of a new rust race, in 1956, which was virulent on Gabo and on Celebration. In the early part of the season this race was concentrated in the Inverell district, but it has now spread through the south-west and is known to occur also in Victoria.

A new northern crossbred is to be tested at Experiment Stations in the south. The hybrid concerned is a selection from a cross between two unnamed hybrids, Dundee x Kenya and Bobin x Bobin x Gaza. In the University tests over the past four years in the Parkes district, it has been the equal of Bencubbin in yield, and its superior in baking quality.

Diseases.—Naturally, root rots were the most serious diseases in 1956, losses of up to 75 per cent. occurring in the south.

Stem and leaf rusts occurred moderately, but generally had little effect upon grain yield or sample. *Septoria tritici* was prevalent but had little effect. *Septoria nodorum*, though not prevalent in most districts, markedly affected individual crops in some central and southern districts. Javelin 48, Brolga and Curlew varieties were most affected.

Small infestations of loose smut were noted in all districts, especially where farmers use home-grown seed. Departmental pure seed was noticeably free from loose smut. Seed treatment kept down the incidence of bunt, there being only four cases reported. A new cereal disease in New South Wales, "Eye-spot", was identified in the Wagga Wagga district. In the few crops known to be affected, the worst cases resulted in a marked reduction of yield. Flag smut and powdery mildew were negligible, as was frost damage, except in isolated localities.

Wheat Quality.—Wheat baking quality received increased consideration during the year. The Conference of Cereal Breeders and Geneticists at Longerenong, Victoria, a Conference of Southern New South Wales Cereal Breeders at Wagga Wagga, and the Commonwealth Wheat Quality Conference at Canberra were attended by officers of this department.

Following the Commonwealth Wheat Quality Conference a committee was set up to assess wheat production and the potential for quality improvement. The Special Agronomist (Cereals) of this Department is the New South Wales representative on this Committee. Assembling of information is now well under way.

Baking quality tests of new varieties and promising material were carried out by the Chemist's Branch, the Wagga Wagga Agricultural Research Institute and the Bread Research Institute. More extensive testing, including check bakings, is planned for promising lines approaching the release stage.

Variety Trials.—Variety trials at Experiment Farms and in Farmers' Experiment Plots throughout the State were continued. Arrangements were made with forty-six farmers in seventeen Agronomists' districts to conduct trials on some

twenty-nine varieties. For the 1957-58 season arrangements have been made with fifty-eight farmers to carry out variety trials.

Planting of, and results of trials were affected by the unusual season. However, it was found that many varieties which yield well in normal seasons were adaptable to the unusual conditions.

In the Southern Division, Bencubbin, Curlew, Javelin 48, Glenwari and the promising new hybrid R.D.R. x 4 Ridley '8 gave satisfactory yields under a wide range of conditions in Farmers' Experiment Plots. Where sown, Pinnacle, Bordan and the new Victorian variety Sherpa also did well. In 1/40th acre trials carried out by the Agricultural Research Institute and this Division, the outstanding late maturing hybrids were K.B.F.B. P4 Bga. C15500 and B.D.G.N.D. C17222. Outstanding mid-season maturing hybrids were R.D.R. x Insignia 49, Orfed x 4 Dirk and Gabo x 3 Dirk.

In the Northern Division, the Departmentally-bred variety Festival performed well in Farmers' Variety Trials. Other varieties to show promise were Saga and Sabre, while the standard varieties, Charter and Gabo, also yielded well.

Soil Fertility and Rotation Experiment.—A soil fertility and rotation experiment at Condobolin Experiment Farm is well under way. Despite the wettest year on record at the Farm, good cereal yields were obtained last harvest. Soil, grain, and pasture samples will be tested.

Some experiments were abandoned because of the wet season, and results of others were insignificant.

Field Wheat Competitions.—The Royal Agricultural Society conducted six Divisional Championships, and field judging was by officers of this Department. Approximately 350 crops were entered in forty-one local competitions. Main highlight was the increased interest of entrants in rust resistant varieties and varieties of better baking quality.

Junior Farmer Wheat and Oat State Championships.—Nine Junior Farmers from five clubs took part in the State-wide wheat growing project and four Junior Farmers from four clubs took part in the oat growing project. Winning wheat was Sabre, a promising new variety with some rust resistance and with good baking quality. The winning oat crop was Algerian which yielded 78 bushels per acre.

Pure Seed Production.—Supplies of recommended varieties were maintained and distributed through Registered Growers. Seed of the newly recommended Javelin 48, which possesses some rust resistance under southern conditions, was widely distributed. Ninety-nine Registered Seed Wheat Growers working under the supervision of twenty District Agronomists undertook seed increase of fifteen wheat varieties: eighty-one Registered Seed Oat Growers in twenty-three District Agronomists' areas carried out seed increase of eleven oat varieties; and six farmers in four Agronomists' districts undertook Registered Seed Production of three barley varieties, including the recently released Departmental variety. Ablyn.

Seed stocks of Weethalle rye were maintained and following last harvest, surplus stocks were made available for sale to farmers.

Some Foundation Seed was produced last season at Wagga Wagga Agricultural College and Experiment Station, at Temora, Condobolin, Trangie, Leeton, New England and Tamworth Experiment Farms. The very wet season resulted in decreased areas of sowing of both foundation and Registered Seed. The plan initiated last year to carry over seed from season to season, proved its value.

Initial selection work and preliminary increase of wheat and oats was continued at Temora Experiment Farm. Similar work with some oat varieties suitable for Northern Tableland conditions was undertaken at New England Experiment Farm.

Arrangements have been made to supply Foundation Seed from the 1956-57 harvest or carry-over stocks, for 1957 sowings, to 102 Registered Seed Wheat Growers, eighty-eight Registered Seed Oat Growers, and five Registered Seed Barley Growers.

Oats

Due to excessive rain, the area sown and total production were well below that of recent years. The area seeded was approximately 650,000 acres, from 350,000 acres of which about 5,250,000 bushels of grain were harvested, representing 15 bushels per acre.

Variety Popularity.—Belar, Algerian and Fulghum, in that order, remain the most popular varieties. Burke occupies fourth place, and the promising variety, Dale, fifth place.

Oat Experiments.—Oat variety trials at Experiment Farms and in Farmers' Experiment Plots were continued where possible. Arrangements made in 1956 to conduct variety trials involving sixteen varieties, were, unfortunately, brought to nothing because of the excessively wet winter. For the current crop season (1957-58), arrangements have been made to conduct oat variety trials on Experiment Farms and on twenty-seven private farms.

In Farmers' Variety Trials in Slopes and Plains districts, Fulmark was consistently good, but Avon, under test for the first time in these trials, was not outstanding. In Tableland district trials, Garry was generally superior to Lampton in spring sown trials. It also performed well at Tumut.

In Experiment Farm Variety Trials in the south of the State, best results were from Fulmark, V.R.A. W4304, Victor-grain 4, Fulgrain 6, Osage and Yates Algerian.

At New England Experiment Farm, Varieties which performed well included V.R.F.B. W4301, V.R.A.F. W4514, and Yates Algerian.

Oat Improvement.—Oat improvement work continued at New England Experiment Farm and Crown Rust selection work was recommended at Grafton Experiment Farm. Arrangements have been made to begin preliminary oat testing this season at Tamworth Agricultural Experiment Station. To serve the south of the State, an intensive oat breeding programme has been initiated by the Wagga Wagga Agricultural Research Institute.

During the year, a new Departmentally bred oat variety of similar maturity to Belar was named Fulmark. This variety has done well at Temora and may replace standard varieties. Registered Seed is now being produced.

Barley

Production statistics for the 1956-57 season are unavailable. It seems certain that much less than the intended 95,000 acres was actually sown, due to the wet season.

Comparative fodder trials with barley, oats and wheat were continued at the New England Experiment Farm. These trials are to be terminated at the end of the current season when results will be summarised.

Barley breeding and experimentation remains in abeyance until such time as the increase in barley production warrants revival.

Rye

As with barley, 1956-57 acreages and yields are not fully known. It is believed, however, that a substantial proportion of last season's grain was saved for 1957 seed sowings in view of the expected demand from manufacturers for rye grain. During the previous season (1955-56), 33,567 bushels of rye grain were harvested from 3,447 acres; an average of 9.7 bushels per acre.

Farmers proposed sowing more in 1957, but the protracted dry sowing season will prevent this.

Seed stocks of Weethalle rye were maintained at Trangie Experiment Station and following the 1956-57 harvest, surplus stocks were sold to farmers. At New England Experiment Farm, isolation areas of Strain 8, Black Winter and Balbo were sown.

Maize

An estimated 70 per cent. of maize sown was hybrid. The proportion would have been higher, but for a shortage of late-maturing hybrid seed.

Hybrid Maize Improvement Programme.—Trials were continued at Grafton, and at the New England Experiment Farms, where results were good. However, a hailstorm at Grafton destroyed 75 per cent. of hand pollinations and ruined all yield tests.

The male-sterility programme at Grafton progressed, as did the leaf blight resistance project, to a lesser extent.

District Trials.—Thirty-four trials for grain and six for fodder were sown and good results are expected. Very short-season hybrids were tested for the first time on the Southern Tablelands and at Guyra on the Northern Tablelands. Results were promising.

Hybrid Maize Foundation and Certified Seed.—Hybrid maize Foundation Seed production was done entirely by farmers, under the Hybrid Maize Seed Certification Scheme.

At least 14,000 bushels of hybrid maize seed are expected to be certified, compared with 8,445 bushels last year. The entry of the Shand Selected Seed Company to the Certification Scheme is responsible for most of the increase, although the season has been particularly good.

Maize Introductions and Trials.—This year's maize introduction grown at Leeton Experiment Farm gave good results.

Trials concerning fertilizer and spacing, seed treatment, flat versus round seed and residual effect of insecticides on maize crops were continued. The red clover-maize rotation experiment was also continued at New England Experiment Farm.

Sweet Corn

Work with this crop was confined to maintenance of inbred lines, Foundation Seed production and yield testing at Yanco Experiment Farm. A successful yield test was also held in the Glen Innes District.

The U.S.A. hybrid, Iochief, is now the most popular canning variety in New South Wales, having displaced Golden Cross Bantam.

The season has been very unsatisfactory and estimated seed yield is 250 bushels; less than half what could be absorbed.

Popcorn

The hybrid popcorn breeding programme has been maintained at New England Experiment Farm.

Although most hybrid popcorn seed produced last year was disposed of at satisfactory prices, seed growers did not produce further seed this year. A shortage can thus be expected. Commercial crops of hybrid popcorn, grown for the first time this year, have yielded well.

Sweet Sorghum

Improvement and Foundation Seed production of the varieties Saccaline and White African have been continued at Hawkesbury Agricultural College and Grafton Experiment Farm. Improvement of Early Orange has been pursued with the co-operation of Mr. G. Paten, of Moruya.

Last year, thirty-six seed growers produced 3,565 bushels of certified sweet sorghum seed while this year nineteen growers are expected to produce about 2,000 bushels. An unfavourable season is the main reason for the expected steep fall in production.

No district trials were sown this year as there was insufficient seed of new introductions worthy of testing.

Grain Sorghum

Seed production of established and newly-introduced varieties was continued at Yanco and Leeton Experiment Farms. Some of this seed was used for yield testing and some was sold to farmers. Eight district trials were sown. Caprock and Alpha are at present the two most important varieties in New South Wales.

Broom Millet

Improvement work with this crop was continued at Bathurst Experiment Farm and in the Tumut district. Fertilizer trials with superphosphate and sulphate of ammonia have given outstanding results at Tumut.

The improved Bathurst strain of broom millet, shown last year to be unsuitable for the Tumut district, showed promise in the Hunter and Richmond river areas.

Sudan Grass and Columbus Grass

SS6 Sweet Sudan grass has now largely replaced common Sudan grass in New South Wales. Another sweet Sudan strain, Lahoma (from U.S.A.) is at present under test. An early frost destroyed this year's seed increase area and so district testing will be delayed.

Columbus grass (*Sorghum alnum*) selection was continued at Grafton Experiment Farm but little work was done with it at Trangie Agricultural Experiment Station. Testing of a red-seeded selection was commenced at Grafton. Coloured seed would permit differentiation from Pohnson grass seed. A cross between Columbus grass and SS6 sweet Sudan grass was attempted at Grafton but was unsuccessful.

Fodder Millets

Several trials comparing Siberian and Japanese millets for grazing were carried out in coastal areas. Siberian shows promise for late sowings, but Japanese is the better earlier in the season.

Fodder Cane

A number of varieties are under test at Grafton Experiment Farm. Trials in the Kempsey area are showing the superiority of new disease-resistant varieties.

Summer Legumes

Trials and limited seed production were continued at Grafton Experiment Farm with soybeans, cowpeas, *Crotalaria* species, velvet beans, mung beans and kudzu, etc. District trials were continued on the central and north coast. *Phytophthora* stem rot caused much damage in commercial cowpea areas. Three resistant varieties were introduced from Queensland for seed increase in the coming season.

Soybean trials and seed production continued at New England Experiment Farm.

Winter Legumes

Trials and seed production with field peas were continued at Grafton and New England Experiment Farms. The varieties Kellerva and Valley show promise.

Vetches and tares are being tested for grazing on Grafton and Wollongbar Experiment Farms. Both sod-seeding and sowing into prepared seed beds are under trial. Many district trials with vetches and tares were also held, Golden tares giving best results.

New lupin varieties are being tested at Hawkesbury Agricultural College and two sweet varieties show promise.

Rape and Kale

A small number of grazing trials with these crops were carried out. Kale seed production has proved difficult under New South Wales conditions.

Russian Comfrey (*Symphytum peregrinum*)

As a consequence of Press publicity interest in this has increased. A small number of plants is under trial at Grafton Experiment Farm but results so far are inconclusive.

Rice

General.—Abnormally cool and wet conditions early in the season, and insect and bird depredations, were serious obstacles to production. Land preparation was delayed and less effective than usual so crops were very weedy.

A blood worm insect pest, not previously a pest in this State, caused considerable damage by feeding on the roots of young plants in the Murrumbidgee Irrigation Areas. Quick detection and effective control measures minimised losses. Nevertheless, individual farmers lost up to 60 acres of rice through the pest.

Average yields were 1.75 tons per acre, compared with 2.34 tons the previous year.

An interesting outcome of the destruction by bloodworms of 60 acres of rice on a property at Yanco was the aerial reseed-ing of the area, using pregerminated grain dusted with the insecticide Dieldrin, following Departmental advice. Although sown two months later than usual this crop reached maturity in 140 days, some 40 days less than normal for the variety used.

Pure Seed Rice.—The Pure Seed Rice Scheme has played an important part in increasing yields since the inception of rice growing in this State. To meet the demand for foundation seed of Caloro II rice, more was sown at Leeton Experiment Farm and special attention was paid this aspect of the rice improvement programme. As a result, some 500 bags of cleaned seed is expected to be available for sale for 1957-58 sowing compared with 150 bags in 1956-57.

Artificial Drying.—Results of artificial drying and bulk handling experiments indicate that sun-cracking (estimated to reduce the value of the crop by as much as £250,000 per annum), may be greatly reduced by harvesting at higher moisture content and artificially drying the crop. Artificial drying also facilitates bulk handling.

Besides foundation seed of Caloro II rice, sowing seed of Late Caloro and Calrose was distributed to growers nominated by the Rice Board. Late Caloro matures ten days later than Caloro II and has lost favour on that account, but using drying machinery permitting earlier harvesting the higher potential yields and later harvesting period of this variety can be exploited.

Trials and Experiments.—Calrose, a medium grain rice, has shown better cooking qualities than Caloro II in trials at Yanco Experiment Farm. A number of intermediate varieties such as Nato, Toro and Bluebonnet have proved fairly adaptable to local conditions, but experience to date shows the yield potential of these is only about half that of the currently sown round grain rices.

The rice rotation experiment at Yanco Experiment Farm was continued.

Tobacco

The area planted to tobacco in 1956-57, viz. 1,130 acres, was the highest for ten years. Yields and quality were better than usual.

The percentages of Australian leaf required to be used in manufactured products to permit rebate of customs duty were increased to 14½ per cent. and 22½ per cent. for tobacco and cigarettes respectively, to operate from 1st July, 1958. This together with the British-Australian Tobacco Company's intention to purchase all grades of leaf within its purchasing schedule on a long-term basis, should engender confidence.

Blue Mould Investigations.—Breeding work was continued at Bathurst Experiment Farm. Imparting the blue mould resistance of wild tobacco to smoking types progressed.

These investigations are to be transferred to the New England Experiment Farm which is closer to commercial tobacco growing areas. A glasshouse, laboratory and field sub-station are to be provided.

Tobacco Breeder Overseas.—The tobacco breeder, Mr. H. W. Lea, is in the U.S.A. for six months to observe new techniques in tobacco breeding, especially irradiation.

Other Trials.—Investigations in co-operation with farmers produced valuable information on insecticides, chemical desuckering agents and new varieties. Fertilizer trials were spoiled by hail, and a barn fire destroyed one picking from a trial at Ashford.

Methyl Bromide fumigation instead of heat treatment for pre-sowing weed control in tobacco seed beds proved effective and many growers intend adopting this practice.

Funds for Research.—Funds from the Tobacco Industry Trust Account became available for the first time in 1956-57. New South Wales received £10,200 for capital expenditure, and also £8,500 for maintenance expenditure for both 1956-57 and 1957-58. This is an increase of £4,000 per annum in the funds available for tobacco research.

Linseed

Despite bad seasonal conditions, yields up to 27 bushels per acre were common. The State average is expected to be about 12 bushels per acre instead of the usual 9 bushels.

Farmers proposed sowing 6,000 acres for 1957, compared with 3,000 in 1956, but dry conditions delayed plantings and it is not possible yet to determine what area will be sown.

New Varieties.—Much of the increased interest in linseed is due to release by the Department of two new introductions, Plate and Marine, after successful trials in the North-west. These two varieties appear to be higher yielding, while Marine is also fairly resistant to Pasmio disease.

Breeding and improvement work was continued at Tamworth Agricultural Experiment Station and in farmers' trials in the North-west.

Safflower

Owing to increased interest in Safflower, about 2,000 acres were sown. Three acres of the new variety, Horowitz, were sown for pure seed production by a co-operating farmer under Departmental supervision.

Hops

Further successful trials were held at Bathurst Experiment Farm. Small areas were sown experimentally by farmers using planting material from the Departmental trial areas.

Peanuts

A slight revival of interest in peanuts resulted from better market prices. Variety trials were carried out in the Barham district and seed stocks of the best selections increased at Grafton Experiment Farm.

Ramie

A larger area was sown at Wollongbar Experiment Farm and processed fibre samples evoked favourable comment from U.K. manufacturers. Large areas close to central processing plants are required for large scale development, but it has proved difficult to locate suitable areas.

Cotton

Much interest in cotton was shown in the North-west and district trials were undertaken at Narrabri, Gunnedah and Moree. Results show that the black soils, suitably cultivated, can produce average quality cotton.

Other Oil and Fibre Crops

Economic considerations generally rule out new ventures involving cultivation of such as castor bean, sesame, tung, etc.

Drug Crops

Much unduly favourable publicity was given by outside interests to the financial aspect of growing the corkwood tree (*Duboisia sp.*), the dried leaf of which is exported for the manufacture of drugs. A leaflet was prepared detailing the methods of production and the prospects for marketing this leaf.

Vegetables

At Hawkesbury Agricultural College the breeding of hybrid tomatoes was continued and the breeding of improved glasshouse varieties commenced. Hybrid tomatoes developed at the College gave promising results in commercial glasshouses in the Mona Vale and Warriewood districts.

Owing to increased interest in vegetable processing, special attention was paid at Yanco Experiment Farm to development of improved varieties of beans, peas, and tomatoes for canning and freezing.

With the appointment of a Bean Seed Certification officer to the South Coast area, the Certification Scheme functioned smoothly and about 600 bushels were produced. Small amounts were also harvested at Wellington, Tenterfield, and in the Murrumbidgee Irrigation Area.

The Terranora Demonstration Plot near Murwillumbah yielded information of local value. The present season was marked by increased sowings and heavy production. In fact, since October, 1956, overproduction of one kind of vegetable or another has been continuous.

There was an expansion in vegetable production for processing, in inland districts, growing vegetables on alluvial flats at Mudgee and Gulgong for that purpose being an important

example. Record quantities of tomatoes for processing were grown in the Murrumbidgee Irrigation Area and a near record bean crop was canned at Batlow.

Potatoes

Breeding.—The breeding programme was expanded and the glasshouse at Glen Innes used for growing seedlings, and for screening of seedlings for disease resistance. The Scottish introductions 1,928 (e) 2 and 1,521 (c) 3, the Australian seedling 11-79 and the U.S.A. variety Saco, B 24-58 and B 595-76 were frequently used as female parents. Seven different crosses were made with the *Solanum andigenum* variety Emilia, which is highly resistant to Common Scab. For pollen parents the varieties Katahdin, Cherokee, Menominee, Merrimack and B 2,368-4 from U.S.A. were used, as were the Departmental varieties Crana, Adina and Awaba.

In respect of resistance to late blight, promising progenies were obtained from the crosses (1,928 (e) 2 x S 2,840), (1,928 (e) 2 x Cherokee), (11-79 x Cherokee) and Pungo x Cherokee.

At the Mann River substation, selections were made from the crosses 128 x 11-79, Sequoia x 11-79 and Sequoia x Cortland. From 650 seedlings of the cross Bismarck x 11-79, twenty-five were selected for further trial. Ninety third-year seedlings were grown and 34 selected for further trial. Promising selections were made from the crosses Monak x 11-79, Awaba x 336-123 and 63-3 x Cortland. Forty fourth-year seedlings were grown, good selections being made from the crosses Monak x 11-79, Awaba x 336-123, S 2,540 x Adina and S 2,680 x Adina. One selection from S 2,540 x Cortland proved to be immune to the common race of late blight.

Forty of the most advanced seedlings were included in a preliminary yield trial on a farmer's property. Seedling S 2,821, 835a x 4 x Awaba was the most impressive. Other promising lines were selections from Monak x 11-79 and Sebago x Adina.

Potato Introductions.—The most promising recent introduction is Redburt, from U.S.A. Older introductions which gave good results were Canso from Canada and Delus, Pungo and Merrimack from the United States. Other introductions of promise as parents included 1,928 (e) 2 and 15-91 (b) 9 from Scotland and B 922-6 from U.S.A.

Disease Resistance.—Advanced seedlings were tested for blight resistance by the Biology Branch using the "detached leaf" technique. Eight seedlings proved immune to the isolates used. Three of these seedlings were included in the preliminary yield trial and gave good results.

Young seedlings were tested for resistance to Common Scab by sowing them in infected vermiculite.

Soil Fertility Investigations.—This project, which is being conducted in co-operation with the Guyra Potato Growers' Association, demonstrated to local growers that improved pastures can be established on the "worn-out" red soils in that district, and that a period under a clover-rich pasture increases yields obtained from subsequent crops of potatoes and oats. Results this season were not as good as in previous years on account of the dry season and heavy moth infestation; a preliminary survey however indicated that the differences in yields will be in accordance with the previous season's results.

Variety Trials.—Shortage of suitable seed reduced the number of trials laid down, but at least one trial was conducted in each of the main districts. Yields were low due to dry conditions, except in more favoured areas such as the Northern Tablelands. Yields from irrigated trials gave an increase of almost 150 per cent.

Departmental seedlings gave the highest yields in almost all areas. In coastal trials planted from July to September, the highest yields were obtained from S 2,700, S 2,702, and S 2,705, all Departmental seedlings. Walanga yielded well, but is rather late in maturity for coastal conditions. In main-crop districts, the Departmental seedlings S 2,702, S 2,680, S 2,770 and S 2,671 performed well. Walanga again was the most impressive variety. Ontario from U.S.A. yielded well in some instances, but Kennebec and Empire, both from U.S.A., were not as promising as in the previous season.

Potato Seed Certification.—Following last year's steady demand for New South Wales certified potato seed, and the general high prices obtained, the decline in production was checked. 1,076 acres were entered for certification in 1956-57 from one hundred and thirteen growers. The area certified was 923 acres. The health standard of the crops entered for certification has steadily improved since the seed certification scheme was introduced. In 1949, 48.10 per cent. of crops

inspected were rejected, 14.12 per cent. in 1954-55, 11.43 per cent. in 1955-56 and 10.10 per cent. were rejected in the last season.

Other Investigations.—Advanced testing and seed increase of new varieties was continued on the Central Tablelands under the supervision of officers of Bathurst Experiment Farm.

Cooking tests on promising varieties were carried out by the C.S.I.R.O. The seedlings S 2,671 and S 2,776 and the Variety Sebago, were outstanding.

Experiments with treatment of cut sets to prevent pre-emergence decay were continued. The best treatments included single sets untreated, tubers held in cold storage prior to planting, tubers cut and planted immediately and tubers cut and treated with Crag 658.

Trials were continued with Maleic hydrazide to test its effectiveness in maintaining quality during storage. Results have been very promising.

Agricultural Extension Grant Demonstrations.—Three demonstrations to stimulate potato production were established in new districts.

The New England Experiment Farm glasshouse trials were described and demonstrated to visitors throughout the year.

Tomatoes

Tomato Breeding.—Breeding of market and canning varieties resistant to Fusarium Wilt was continued at Hawkesbury Agricultural College and Yanco Experiment Farm and breeding of glasshouse varieties resistant to Leaf Mould (*Cladosporium Fulvum*) was commenced at the former.

Seven lines of the cross (Rouge de Marmande x L. Pimpinel-lifolium A. 160) were immune to Fusarium Wilt and showed good agronomic qualities in tests at Hawkesbury Agricultural College. Seed supplies are being increased for field testing. Good results were again obtained with the first generation hybrids Break O'Day x Rouge de Marmande, Grosse Lisse x Rouge de Marmande and Grosse Lisse x Valiant. Eight introduced varieties were resistant to existing strains of Leaf Mould (*Cladosporium Fulvum*). The most promising of these were used as parents in crosses with Chinese types and are now under test in the College glasshouse and in commercial houses at Mona Vale.

At Yanco Experiment Farm, three new crosses, using Red Top, Pan America, Bonita and V. R. Moscow as parents, were used to produce canning types resistant to Fusarium and Verticillium wilts. Over 3,000 plants of 2nd and 3rd generation crosses were grown for testing for Fusarium wilt resistance.

Introductions.—The most promising introductions tested were: Roma, Grand Pak, U.C. Hybrid-11, U.C. Hybrid-2, and Firesteel from U.S.A., Q5 from Queensland and Bush from Denmark.

Variety Trials.—In a replicated trial of canning varieties at Yanco Experiment Farm, Jefferson from U.S.A. yielded equally with Tatura Dwarf Globe but was superior when canned and higher in soluble solids. It was also highly resistant to Fusarium Wilt, outyielded Tatura Dwarf Globe and proved an excellent canning type. Tatura D.G. x TX 160A-1-1 was the most promising of the hybrids on account of high yield and Fusarium Wilt resistance.

A trial at Bathurst Experiment Farm in which ten varieties were compared, showed the value of varieties of indeterminate growth under tableland conditions. Indeterminate growth protected the fruit from frosting and yielded good quality fruit when determinate types were almost completely destroyed. Urbana, Sugawarra and Valiant gave the highest yields, being superior to Grosse Lisse in this respect.

Fruit Setting Hormones.—The effects of three fruit setting hormones were tested in the glasshouse at Hawkesbury College. Duraset gave the best results.

Beans.

Bean Breeding.—Breeding experiments were continued at Hawkesbury Agricultural College and Yanco Experiment Farm. At the former, testing of varieties and crossbred lines for resistance to the two races of Anthracnose known to exist in New South Wales was completed. Four lines of Fullgreen x Brow Beauty, which are resistant to Anthracnose race No. 1, field tolerant to race No. 2 and field tolerant to rust and American Common Blight and four lines of Hawkesbury Wonder Granda field tolerant to Rust and Halo Blight, were yielded.

tested in comparison with Windsor Long Pod x Brown Beauty. Two lines of Fullgreen x Brown Beauty (Nos. 15 and 18), which have a multiple disease resistance, gave 8 to 10 per cent. higher yields than Windsor Long Pod. Two lines of lawkesbury Wonder x Granda (Nos. 23 and 26) were significantly higher yielding than Windsor Long Pod, with increases of 33 per cent. and 25 per cent. respectively. Several other lines of both crosses, although the yield could not be tested, were also promising, and supplies of seed were increased for field testing on the coast. Other promising crosses were Windsor Long Pod x Brown Beauty and Logan x Granda. Of the stringless types, selections from Brown Beauty x Landreth Stringless and Fullgreen x Brown Beauty were the most promising for both yield and quality.

Seed quantities of two promising field bean types, Brown Beauty x Little Navy and Granda x Little Navy, were increased for field trials. These lines were immune to both races of Anthracnose, resistant to rust and field tolerant to American Common Blight and Halo Blight.

At Yanco Experiment Farm, breeding was continued with the object of developing white-seeded bush type canning varieties. Crosses with Processor, Slender-green and Processor and Blue Lake F.M.I. were grown in early generations.

Introductions.—Of the introductions tested, the most outstanding were Seminole, Slendergreen, Stringless Blue Lake, Black Valentine, Supergreen, Samilac, Processor, Contender and Wade—all from U.S.A. and Virgo from Denmark. Processor and Seminole both gave good results under commercial conditions.

Variety Trial.—In a stringless Pole-Bean variety trial at Yanco Experiment Farm the recent introductions Blue Lake 9-3006, Blue Lake Stringless selection and Blue Lake 49-205-3 yielded more than the commercial Blue Lake Stringless and with the exception of Blue Lake 49-205-3 proved to be more suitable for canning.

Quick Freezing Tests.—In a co-operative project with the C.S.I.R.O. frozen samples were prepared of five recently introduced varieties of stringless beans grown in a replicated trial at Yanco Experiment Farm. After four months storage, the quality of all lots was satisfactory, with only small differences between varieties. Seminole and Processor were the best of those studied.

Seed Production.—The French Bean Seed Certification scheme was continued under favourable conditions and some good yields were obtained. Six hundred and ninety acres were submitted for certification in 1956-57 compared with 708 acres in 1955-56. Of this total, 585 acres were certified compared with 445 acres the previous season. The acreage certified on the south coast included 378½ acres of Brown Beauty for an estimated yield of 3,665 bushels of seed, Hawkesbury Wonder 5½ acres (850 bushels), Tweed Wonder 46 acres (515 bushels), Wellington Wonder 39½ acres (450 bushels), Windsor Longpod 12½ acres (160 bushels), Landreth Stringless 8 acres (60 bushels), Clarendon Wonder 3½ acres (90 bushels) and Goward's Special ½ acre (4 bushels). Also small areas were certified at Wellington, Tenterfield and in the Murrumbidgee Irrigation Area.

Green Peas

Breeding.—Breeding of improved varieties of peas for market and processing was continued at Hawkesbury College and Yanco Experiment Farm.

At Hawkesbury, a number of selections of the crosses Early Wonder x Canner No. 75, Early Dwarf x Canner No. 75, Early Wonder x Green Feast, Early Dwarf x Green Feast and Super Alaska 30 x Green Feast in the fourth and sixth generations were promising for early yield, concentrated maturity and high quality. Further selections were made for seed increase and additional yield and quality testing.

At Yanco Experiment Farm, the most outstanding lines were selections from Greenfeast x Massey and Greenfeast x Ylucus Early Dwarf, on account of high yield and uniform maturity.

Further crosses grown in the second generation were Greenfeast x Edible Poddie, Canner No. 75 x Mildew Immune and Australian Winter x New Era.

Introductions.—The most promising of the introduced varieties under observation are Dark Seeded Perfection, Perfected Freezer, Shossone, Hyalite, Dark Green Perfection, Victoria Freezer, Early Perfection, Pluperfect and Hardy—all from the U.S.A.

Quick Freezing Tests.—In a study of the freezing quality of successive pickings of the varieties Canner 99L, Canner No. 75 and Greenfeast, in co-operation with the C.S.I.R.O., some

differences between varieties were observed. At an early stage of maturity samples of Greenfeast were slightly inferior to those of Canner 99L and Canner No. 75 while at a more advanced stage, Greenfeast was slightly superior to the others. Analytical work on many samples of peas processed at different stages of maturity made it possible to apply a convenient laboratory procedure for testing maturity of peas after freezing.

Agricultural Extension Grant Demonstrations.—Demonstrations of pea seed production in wheat districts were unsatisfactory due to the unfavourable season and incidence of bacterial blight. Two further demonstrations were established in areas considered more favourable for seed production.

Rockmelons

Nineteen lines of the cross PMR 45 x Rio Sweet were grown in isolation at Yanco Experiment Farm and artificially infected with Powdery Mildew. Four of these were resistant to the disease and had good agronomic characteristics. They were grown in the glasshouse for further selection. Of the introductions tested the most promising were Sulphur Resistant No. 91, Harvest Queen, Delicious and Early Delicious, all from U.S.A.

To demonstrate the growing of Rockmelons in the area the variety PMR 45 was sown in August at the Terranora Demonstration Plot. Molybdenum spray was applied and a good yield of excellent quality fruit was obtained.

Carrots

Of a number of introductions under observation, the most promising were Improved Gold Spike, Strong Top Nantes and Royal Chantenay, all from U.S.A.

Seed Investigations.—Insecticide treated seed crops were found to produce higher yields than untreated crops. Plots treated both fortnightly and monthly with Systox (0.025%) grew better than those dusted with 2.5 per cent. nicotine dust and sprayed with 0.1 per cent. DDT at fortnightly intervals.

Crucifers

Of the cabbage, cauliflower and sprouting broccoli under observation, the most outstanding were:—

Cabbage.—Brunswick from Denmark, Greenback from U.S.A. and Hybrid No. 8 and No. 14 from H. Friend.

Cauliflower.—Selandia and Snowdrift from Denmark.

Sprouting Broccoli.—Grand Central and Texas 107 from U.S.A.

Onions

A project to incorporate the male sterile factor into the Hunter River Brown variety for the production of a hybrid suitable for local conditions was continued at Hawkesbury Agricultural College. Excel A (sterile line) was crossed with Hunter River Early Brown and with T.E.G. 951. The crosses were successful and seed was sown for further testing.

Cucurbits

Of the cucumber introductions tested the most promising of the slicing types were: Palomar, Steno, Ashley Best and Niagara from U.S.A. Of the pickling types, National Pickling from U.S.A. was outstanding.

The most promising watermelons were: Florida Giant, Market Wonder and Charleston Gray from the U.S.A.

Small Sugar Pumpkin from U.S.A. gave an excellent yield of small, good quality pumpkins.

Lettuce

Of introductions under observation at Yanco Experiment Farm the most outstanding were Great Lakes 118 and Great Lakes 366 from U.S.A.

Miscellaneous Vegetables

Wonder 3840 Garden Beet was very promising for marketing and canning.

The most promising best celery introductions were Utah 52-70 and Utah 16 from U.S.A.

Demonstrations with Soil Blocks

Funds provided by the Agricultural Extension Grant enabled importation of a soil block making machine with which to establish crops which are normally propagated in seed beds and transplanted. Results of demonstrations in the County of Cumberland and the Wyong area were encouraging. A further demonstration was televised.

Rotation Experiment

The vegetable rotation experiment at Hawkesbury College was terminated. Potato yield showed significant response to farmyard manure, trash and green manure treatments. The average response to farmyard manure was: 1.36 tons per acre (23.2%), to trash 0.93 tons per acre (16.3%) and to trash oats and vetches 1.65 tons per acre (29.0%).

The average overall response of cauliflowers was 0.3 tons per acre. The responses of sweet corn were small and variable. Peas averaged six bushels, but reached 14 in the absence of trash and green manure.

Tests with Molybdenum

Molybdenum deficiency was again observed in many rock-melon crops throughout the M.I.A. Further trials and demonstrations were carried out. Good responses again followed soaking of seed for twenty-four hours in varying strengths of pure sodium molybdate.

Pastures

Interest in sown pastures persists, but practical response has declined due to dry autumn conditions.

This State however, contributed no less than 43% of all sown pastures in Australia between 1950-51 and 1955-56.

Another encouraging feature is the increase in the amount of pasture hay conserved. In 1950-51, 15,654 acres were cut for hay, while in 1955-56 the area cut was 179,283 acres, an increase of over 1,000%. The tonnage increased from 22,000 to 281,000 tons.

Use of aircraft in connection with pastures and weed control has greatly increased. In the year ended 30th June, 1955, almost half a million acres were treated from the air; of this, 250,000 acres were topdressed, 66,000 combined topdressing and sowing, and 155,000 treated for weed and insect control.

Agricultural Extension Grant.—Two hundred and ninety seven pasture demonstrations are in progress under this grant. Demonstrations showing the value of heavy applications of fertiliser at sowing resulted in many farmers, especially in the Tumut and Glen Innes districts, using 2-3 cwt. per acre of superphosphate in the first year, instead of the usual 1 cwt. Greater bulk from new pastures and a shortening of the clover dominant period of pastures in the wheat and tableland districts resulted.

Farmers' Experiments.—In autumn 1957, 140 farmers' experiments, (an increase of 50 per cent.) were established by District Agronomists throughout the State.

They deal with establishing pastures on "problem" soils and providing data as to whether or not lime-super mixtures or lime pelleted seeds are required for efficient nodulation. Experiments to determine the most suitable pasture species to grow in particular districts were also begun.

Pasture Species Research.—Dry conditions have emphasised the need for more adaptable pasture species. A number of such strains developed are very promising. They are: *Phalaris tuberosa* x *P. arundinacea* Kd 68 Louisiana White Clover (*Trifolium repens*) La 345, Scurfy Pea (*Psoralea bituminosa*), Barrel Medic 173 (*Medicago tribuloides*), Bacchus Marsh strain Lc 10 of Subterranean clover, and Sheep's Burnett (*Poterium sanguisorba*).

For the drier inland areas the perennial grass *P. tuberosa* x *P. arundinacea*, and the perennial legume *Psoralea bituminosa* were very promising. The later also withstood frosts well as far south as Temora.

Another perennial legume, Louisiana White Clover was outstanding under irrigation, in the better rainfall inland areas and on the far north coast.

Among the annual legumes, Barrel Medic 173 showed great promise for the marginal central-west, while in the better areas Bacchus Marsh strain Lc 10 of Subterranean clover performed well.

Sheep's Burnett was reported as outyielding lucerne, on Temora and Cowra Experiment Farms.

The search for "special purpose" pasture species was continued at Grafton, a region having a particular problem in the lack of suitable summer legumes. *Desmodium uncinatum* and *Dolichos bifloris* were particularly promising while *Leucaena glauca* and *Dolichos lablab* were outstanding in the nursery. In advanced trials the perennial grass *Setaria sphacelata* was very promising as a dual purpose silage and grazing type. Two autumn sown grasses, *Festuca elatior* and *F. arundinacea* var. *demeter*, showed promise for heavier soils.

Features of work at other Experiment Farms were the establishment of new observational nurseries at Temora and Cowra and of additional new areas at Trangie, Leeton and Yanco.

The enlarged nursery at Yanco included Parakeelya (*Calandrinia bolonensis*) and Creeping Saltbush (*Atriplex semibaccata*) sown to begin a search for high producing native xerophytes.

At Leeton, an acre plot was sown to Louvana Pea (*Lathyrus ochrus*) which showed considerable promise in the nursery.

Useful seed increase of other species having district potentialities was achieved at Grafton, Trangie and Leeton.

A new species testing area was established at Glen Innes and an extensive single plant nursery of *Phalaris tuberosa* was provided for further selection.

At Temora, plots of hybrid Subterranean clover were grown in co-operation with C.S.I.R.O.

An outbreak of black stem disease (*Phoma medicaginis*) on Barrel Medic 173 occurred at Condobolin and is the first record of this disease in New South Wales.

Pasture Establishment and Management.—Problems of pasture establishment and management under investigation were: legume inoculation, soil acidity and lime use, fertiliser requirements, insect pests, mechanical problems with seeds, species for drought areas, effective grazing and species dominance.

Legume inoculation and nodulation and lime use received much attention. The widespread use of 2 cwt. of carbonate of lime mixed with 2 cwt. of molybdenised superphosphate per acre resulted in a very satisfactory establishment of pasture legumes, even on the more acid soil types. The main centres of investigation were Walcha, Capertee, Goulburn and Bellingen.

Research at Walcha emphasised the importance of both phosphorus and sulphur in the establishment of pasture species in acid soil type. Trials indicated that lucerne needs more lime than Subterranean clover for nodulation in this soil.

Plant Nutrition investigations at Capertee bore out the importance of lime-superphosphate mixtures and lime pelleted seed, together with effective seed inoculation, in establishment of clovers.

In Goulburn experiments, lime pelleted seed continued to promote effective nodulation and establishment of Subterranean clover. There was some evidence that on very acid soils, lime-pelleted seed may be effective only in the first year, so that higher lime rates may be needed either initially or as a topdressing in the first spring.

At Bellingen, plant nutrition and species plots were established to study the local importance of such factors as lime use, fertiliser needs and pasture species.

Fertiliser placement "in" and "out of" contact with inoculated seed was investigated at Grafton Experiment Farm as a means of overcoming nodulation difficulties. In the far North Coast area, the University of Sydney and Department of Agriculture research team continued establishment investigations with sodseeded vetches, winter clovers and summer species. The amnemus weevil restricted legume establishment and persistency in the Lismore area. Research to economically control this pest was begun.

Pasture establishment problems of the Far Western Region were investigated at Trangie, Fowler's Gap and Wentworth.

Buffel grass, the promising summer-growing species, has light "fuzzy" seeds, and sowing problems were investigated at Trangie. Tests included hammer milling and pelleting or sowing by means of a "carrier".

Species establishment trials were sown between Trangie and Fowler's Gap in western New South Wales to study the potentialities of certain drought resistant pastures species in low rainfall areas.

At Wentworth, the problems of pasture establishment under alkaline soil conditions were investigated.

The dominance of subterranean clover or rye grass in the early years of this pasture mixture was investigated at Leeton. Establishment under a cover crop and subsequently cutting the pasture for hay before the rye grass seeded greatly influenced dominance.

Plant Nutrition, Fertiliser Use and Soil Fertility.—Pot investigations were carried out at Hawkesbury College on major and minor trace element deficiencies in a range of soil types.

Another trial was to determine the availability of molybdenum in molybdenised superphosphate as prepared by the "acid-mix" or "dry-mix" process.

Molybdenum remains the trace element most deficient, whilst boron and zinc also assumed some importance, especially where high lime applications were used or where soils were very alkaline (as in irrigation areas). In trials boron and zinc deficiencies were induced with one- and two-ton lime applications on a number of soil types.

Various rates of lime application were studied in regard to legume nodulation, and the release or availability of sulphur, phosphorus and molybdenum.

The importance of interactions of sulphur with potassium, nitrogen, phosphorus and calcium were also demonstrated in pot and plot investigations.

Potash surveys were undertaken in both glasshouse and field trials.

Experiments were continued on rates of superphosphate application.

Farm production trials were commenced to investigate the economics of nitrogen fertiliser use on pastures on dairy and fat lamb properties.

Increased fertility resulting from the use of legumes in wheat belt rotations is leading to prolific thistle and weed growth. Projects at Temora Experiment Farm and Wagga Agricultural Research Institute were commenced to demonstrate that under these conditions perennial grass based pastures are of value in the rotation.

Conservation.—At Wollongbar, investigations were commenced to determine the best stage of grass growth for making silage and the value of certain additives for improving quality and palatability.

Use of plastic covers to exclude air from stack and pit-type silos was tried at Hawkesbury College in association with commercial agencies. A barn hay drier at the College is being used for experimental work in drying hay and grains.

At Leeton, the Meyer roller-mower proved useful on perennial ryegrass-white clover pasture. The rolled sample at actual rolling contained 73 per cent. moisture; after two days the roller-mower sample was reduced to 28 per cent. moisture compared with 48 per cent. in the non-rolled sample. Problems of silage making under irrigation conditions could be profitably studied.

Seed Testing and Regulatory Activities.—All certification tests were carried out without any delay. Due to lack of testing facilities certain classes of seed were imported without examination.

Policing the Seeds Act was more difficult because of the increase of country agents handling local seed and the number of farmer-vendors.

One hundred and sixty-two stores in 30 country towns were inspected and also 85 metropolitan stores. A number of warnings were issued and legal action was taken against four vendors.

Seed Certification.—Over 500 growers participated in the Departmental seed certification schemes which now cover subterranean and White clovers, Phalaris, Barrel Medic 173 and Perennial Ryegrass. Production of certified Subterranean clover exceeded 2,000 tons for the year. The value of certified pasture seed of all types was about £545,000.

Weeds

Six Regional Weeds Conferences were convened, dealing with Eastern and Central N.S.W. A special Conference on Serrated Tussock control was also held.

Due to the wet seasons, many weeds were very prevalent, e.g., thistles (increased soil nitrogen from clovers and improper management contributed to the thistle problem). Bathurst Burrs in the southern districts increased markedly.

Broomrape is more common on the southwest slopes and is causing trouble in subterranean clover pastures. However 2, 4-D provides effective control. In the same region, St. John's Wort increased whilst heavy infestations were apparent also in the Tumut and Mudgee districts. Biological control by Chrysomelid beetles was reasonably effective in the south and control by clover pastures was again demonstrated. Skeleton Weed, although a major weed of the south-west was not the problem that it once was because of control by spraying and pasture improvement.

In the north, after early prevalence, weed growth was restricted by the dry summer. Pastures of phalaris and lucerne afforded good control of mintweed.

In coastal areas, the stem gall fly parasite of Crofton weed spread rapidly and though unlikely to kill plants, there was some weakening which may well reduce seeding in the Spring. Fireweed in coastal areas was vigorously attacked by the larvae of a native moth, *Homoesoma farinaria*. Rushes were very widespread in coastal areas as a result of wet seasons.

Co-operations with Local Government Bodies.—Frequent contact with Councils on noxious plant problems was called for.

Twenty thousand pounds were provided on a pound for pound basis by the Department of Local Government to assist in noxious plant control.

The demand for financial assistance exceeded the amount of finance available.

Serrated Tussock Research.—The problem of serrated tussock was emphasised by show exhibits, field days, press and radio publicity, the establishment of further demonstrations using pastures in its control and in general extension work. There was a greater realisation that pasture improvement and careful pasture management were the keys to successful control.

One demonstration of red clover established at Blayney in a previous year, without seedbed preparation, virtually controlled serrated tussock.

Under arable conditions serrated tussock may be eradicated by preparing a fine seedbed, and then sowing pastures in the autumn. Serrated tussock (pre-burnt) may be controlled in semi-arable areas by the use of a chisel-plough prior to sowing pastures.

Research was concentrated on non-arable areas where establishment of improved species depends on pre-burning serrated tussock and oversowing with clover, the most promising species being Alsike, Red, White and Subterranean, with correct nodulation and nutritional techniques. Management of pastures was found to be most important. Among herbicides tested, Dalapon, TCA, oil and distillate effectively killed serrated tussock. However, low rates of Dalapon and TCA (5 lb. and 20 lb. respectively) applied in autumn retarded growth of burnt tussock, allowing oversown clovers to establish and provide competition.

Palatability of serrated tussock was increased by heavy applications of sulphate of ammonia. Life history and germination studies were also made.

Research on Chemical Weed Control in Vegetables and Other Crops.—Investigations on chemical weed control in various crops, mainly vegetables, were carried out at Hawkesbury College, Yanco and Bathurst Experiment Farms.

Onions.—All work was carried out on pre-emergence application of herbicides. PCP, Sodium PCP and DNBP all proved excessively damaging to the crop while CIPC, CDAA and CMU were promising. On a heavy soil, CDAA which is specific for control of grasses, caused damage at rates over 2 lb. per acre. CIPC was safe up to 4 lb. per acre, at which rate it gave satisfactory weed control. CMU appeared to be safe up to 1 lb. per acre. Irrigation immediately after spraying seemed to increase damage.

Peas.—Pre-emergence treatment showed CDAA to be very good and CIPC to be satisfactory for control of grasses. DNBP amine controlled broad leaved weeds without crop damage. For post-emergence control of weeds, MCPB was far less harmful to peas than 2,4-DB; up to 1½ lb. per acre of the former being tolerated. Ammonium DNBP at 2 lb. per acre was also satisfactory.

Beans.—Pre-emergence trials showed that CDAA and CIPC were satisfactory for grass control and that DNBP controlled broad leaved weeds.

Maize.—Both Simazin and CDAA proved very effective for pre-emergence weed control in maize, the former controlling all weeds throughout the growing period of the crop.

Strawberries.—Among the most promising chemicals for weed control were 2,4-D and DNBP.

Lucerne.—2,4-DB was much safer to use on lucerne for the control of broad leaved weeds than MCPB, MCPA and 2,4-D. Up to 1½ lb. per acre was tolerated by young lucerne, with control of the main weeds present. Dalapon also showed promise for control of summer grasses at about 3 lb. per acre.

New Sown Pasture.—In a trial to control broad leaved weeds in a new sown pasture containing both red and white clovers, both MCPB and 2,4DB caused little clover damage at the highest rate used, namely 1 lb. per acre. Stagger weed was effectively controlled, after a period, by 2,4—DB, which was also more effective on lesser swine cress. Rates as low as ½ lb. per acre were satisfactory.

Soil Fumigation.—In soil fumigation for destruction of weed seeds and weeds, good results were obtained with sodium N-methyl dithio carbonate (Vapam). Most weed seeds in the soil were destroyed by rates of 1½ to 2 lb. per 100 square feet, the chemical being mixed with water and simply poured on to the soil. Useful control of the persistent garden weeds, wild onion and oxalis were obtained at slightly higher rates.

Industry Assistance.—Numerous manufacturers, both local and overseas, generously assisted research work with donations of chemicals and equipment.

Extension Work on Weeds.—Advice on weed control was provided by District Agronomists and the Special Agronomists (Weeds) to farmers, home gardeners, manufacturers and Councils. Information was also forwarded to quite a number of overseas and interstate research officers. Displays relating to weeds were made for several district shows and the Royal Easter Show, in co-operation with the Royal Agricultural Society. The mobile weed spray unit provided from Agricultural Extension Grant funds, enabled further demonstrations to be established.

Irrigation

The Special Agronomist (Irrigation) represents the Minister and/or the Department on a number of inter-departmental committees. Among the more important are:

Murrumbidgee Valley.—Recommendations included building a weir at Gogelderie and provision of irrigation for 845 new farms. Cabinet has approved.

Hunter Valley.—The Abermusden Committee (which is enquiring into irrigation proposals in the Hunter Valley resulting from the construction of the Glenbawn Dam).

Namoi Valley.—The Keepit Dam is being built on this river, and water will eventually be available for irrigation.

The Special Agronomist (Irrigation) spent some time with officers of the Commission and the Chemist's Branch of this Department when a soil survey was being carried out in a section of the north-west from Narrabri in relation to areas likely to be capable of irrigation development. It is expected that a small experiment farm will be established during 1957-58.

Macquarie Valley.—An Inter-departmental Committee was appointed some time ago to make recommendations regarding the development of irrigation from Burrendong Dam.

Flood Mitigation.—The Committee met several times to discuss flood mitigation and flooding along the Murrumbidgee, Murray and Darling Rivers. The committee also drew up the draft of a Bill which it recommended should be presented to Parliament. Legislation was enacted to enable work to be carried out in the Hunter Valley by both the Water Conservation and Irrigation Commission and the Department of Public Works. It also provides for the establishment of an Assessment Board to adjudicate in claims for compensation which may arise. The Special Agronomist (Irrigation) is a member of this Board.

Farm Water Supplies Act.—Under this Act many applications for advances have been received by the Water Conservation and Irrigation Commission. Applications exceeding £1,000 estimated cost, are submitted to this Department for examination. Only 29 cases were received in 1956-57 compared to 109 in the previous year.

However, there has been keen interest shown by farmers in water conservation.

Irrigation Research.—Detailed irrigation research work is proposed.

Spray irrigation equipment has been bought and it is hoped soon to appoint a special officer.

Irrigation at Colleges and Farms.—At both colleges, irrigation is assuming more importance. At Hawkesbury a number of plants have been installed, and construction of a large ring tank is planned.

An inspection was made at Wagga to locate suitable sites for water storage for irrigation, one being selected for construction of a ring tank; also for the installation of spray irrigation of an adjacent lucerne paddock.

War Service Land Settlement

Generally, there has been a degree of uncertainty regarding the future of War Service Land Settlement throughout the State and this has affected activities. Extension activity among settlers under the Scheme increased, however.

The following statistics describe the extent of activities in War Service Land Settlement.

Total number of settlers established to 30th June, 1957	2,527
Total number established under the Promotion Scheme to 30th June, 1957	1,325
Total number established under the Acquisition Scheme to 30th June, 1957	1,199
Brought under the Scheme by Conversion	3
Total area involved in farms acquired	2,853,603 acres.
Total expenditure in purchases only,	£18,875,409

Promotion Cases.—

Total number of applications received under the Promotion Scheme to 30th June, 1957	2,769
Total number of applications received under the Promotion Scheme to 30th June, 1956	2,627
Applications for the year ended 30th June, 1957	142
Applications for the year ended 30th June, 1956	420
Decrease in activity under Scheme—	300 per cent.

The tapering off of this work can be gauged by the fact that of 142 applications lodged during 1956-57, 134 were received during the period 30th June, 1956, to 31st December, 1956, only eight being received in the last half of the year.

Of the 2,527 settlers established to date, 1,325 or approximately 52 per cent. have been settled under the Promotion Scheme.

There has been much discontent expressed by bodies representative of ex-servicemen because of the changes in the Promotion Scheme. When it is borne in mind, however, that during the year ended 30th June, 1956, sixty-four of the applications under the Promotion Scheme were refused, principally because they were below home maintenance standards, and 70 per cent. of the farms acquired during the period 1st July, 1954, to 31st March, 1957, were single farms, involving only a change of ownership the work and expense involved, without bringing about Closer Settlement, was of some magnitude.

Acquisition Cases.—Seven new estates were divided into 111 farms, after inspections, reports and consultations with officers of this Department.

The total number of farms made available by ballot under the Acquisition Scheme, is now 1,197 compared with 1,086 at 30th June, 1956. "Ghoolendaadi" estate in the Gunnedah district, provided thirty-six farms.

Applications for Ballots.—The average number of applicants for the last ten ballots was 1,174, compared with 1,029 for the last ten ballots during the year ended 30th June, 1956, and 1,052 for the first ten ballots in the year 1950.

Co-operation with Other Departments.—This Department co-operated with the Water Conservation and Irrigation Commission in the acquisition of estates in irrigation areas. Twenty-two blocks on the "Kooba" estate in the Griffith area, will be balloted for in the near future. Reports on smaller estates were also made.

Inspections of 46,000 acres of land in the Berrigan district were carried out with a view to acquisition and creation of a new irrigation area.

The Department co-operated with the Rural Bank, the financing institution for settlement in irrigation areas. At the Bank's request, an inspection was made, followed by a

report, on activities of a number of settlers on the "Kooba" subdivision, and recommendations were submitted with a view to safeguarding finance.

The decision of the Government to construct a weir at Gogeldrie, is expected to promote considerable activity in Land Settlement in the Leeton-Darlington Point area.

The Land Settlement officer, assisted the Valuer-General's Department in assessing the agricultural productivity of lands resumed by the Water Board in conjunction with the construction of the Warragamba Dam. Compensation being offered for some land resumed is being contested in Court, and in such cases this Department will give evidence if required.

Verbal advice was also given during the year to the Main Roads Board, on the agricultural capabilities of certain lands being resumed for road alignment.

Advice to New Settlers.—The Special Agronomist and Field Officers play a valuable part in advising new settlers, and contribute much to the success of many.

Field Days on newly settled estates have been of great assistance to settlers in the early development of their farm.

A survey made in nineteen District Agronomists' areas throughout the year, disclosed the following information:—

Soldier settlers' properties inspected by District Agronomists	501
Demonstrations and Experiments conducted on settlers' blocks	62
Settlers participating in competitions during the year	57
Settlers who produced Registered or Certified seed for the year	31
Field Days held on settlers' properties for the year	17

District surveyors have been asked to ensure that each settler obtains a copy of this Department's "Agricultural Gazette".



Controlling Pests and Diseases

The Department is constantly searching for better and cheaper means of controlling pests and diseases. New methods of controlling red scale and white louse on citrue are recorded in this section of the report.

(Photo. from Western Region.)

DIVISION OF HORTICULTURE

Regulatory

PLANT QUARANTINE

Importations of overseas plants and plant products were examined for the Commonwealth Department of Health in accordance with the Quarantine Act.

Seed.—Flower and vegetable seed importations remained fairly steady throughout the year. The main supplies were from the U.S.A. and Holland, with smaller quantities from the United Kingdom, France and New Zealand. Some carrot seed from the U.S.A., Holland and France required re-cleaning due to presence of weed seed, and some fumigation of insects was required. The usual shipments of grass seeds, peas and lupins arrived from New Zealand, and whereas insect infestation was only light, some consignments contained weed seeds and other prohibited seeds, principally cereals, and required cleaning.

Inspection of Goods.—Imported goods subject to plant quarantine inspection and not complying with the regulations were either processed under supervision, vacuum fumigated with methyl bromide, heat treated, or destroyed. Also, where consignments were permitted to be processed under supervision, the outside containers were subsequently heat treated or destroyed.

Nursery Stock.—Importations of living plants were not great. One consignment of 47,000 orchid plants (out of a total of 57,416 plants) came by air from the U.S.A. The balance of the orchids were from the United Kingdom, India, Holland, New Guinea, France and Hawaii. Other plant importations of importance totalled 4,090,832, from six overseas countries. Generally, imported nursery stock was free of pests and diseases, but inspection disclosed various strains of virus in orchids, whilst some consignments of bulbs were infected with mite. Where necessary, nursery stock was fumigated with methyl bromide or dipped in Malathion.

Passengers' Baggage.—Inspection of passengers' baggage was carried out on all tourist and migrant ships entering the port, and a large quantity of prohibited material was detained for quarantine treatment or destruction. Also, all plant material carried on overseas planes was forwarded to the branch depot for examination.

Parcels Post.—Daily inspections were carried out at the Parcels Post Office of parcels and packages from overseas, which contained plants and plant material. Parcels containing bulbs from interstate were also dealt with and certificates issued for all outgoing plant material.

Timber.—Importation of timber, both sawn and in log form, was approximately the same as last year (161,000,000 super. feet). Of this, the amount of sawn timber increased slightly to 146,000,000 super. feet, of which approximately

two-thirds was Douglas Fir from North America. There was a notable decrease from South America (approximately 2,750,000 super. feet), whilst importations from Malaya, Borneo and Indonesia increased by approximately 4,500,000 super. feet.

Sirex Wasp.—Examination of cases and crates from overseas ships continued. *Sirex* wasp and other wood-borers were found in some consignments. These were fumigated under supervision.

EXPORT INSPECTIONS

Exports of fresh fruits, flour and rice were inspected.

Citrus Fruits.—The export of Navel oranges last season was approximately the same as for the previous season. Of a total of 11,024 cases, 9,620 were shipped to Singapore, 1,135 to London and 269 to Colombo. The main supplies came from the M.I.A. and the quality was excellent early in the season, but deteriorated in later lots because of rind breakdown and *Septoria* spot, with the result that 530 cases were rejected.

Export of Valencia oranges increased by approximately 16,000 cases to 50,445 cases, and destinations were: Singapore, 22,968; United Kingdom, 6,344; Germany, 18,133; and Belgium, 3,000 cases. The Valencias were of a high quality, and only 839 cases were unsuitable for export because of hail blemishes, mould and black spot.

Export of lemons increased to 4,929 cases, which went to Hamburg, Zurich and London, and were of good quality.

Apples.—Most of the 18,328 cases of apples exported were shipped to the United Kingdom and consisted mainly of Granny Smith. A radical departure from previous practice in respect of the inspection of export fruit was initiated this season. Country Inspectors were empowered to pass or reject fruit at packing houses, subject to a check inspection on the wharf. The system proved an unqualified success, and much less trouble was encountered at shipside.

Grapes.—Small quantities of O'Hanez grapes were shipped to Singapore, but the consignments, which came from the M.I.A., were small and inferior. Other small shipments of O'Hanez, Black Malaga and Waltham Cross went to Suva.

Flour and Rice.—Export of flour from the Port of Sydney increased during the year by nearly 10 per cent. to approximately 225,000 short tons. The greatest quantity of flour came from country mills, and the monthly totals fluctuated from 27,836 tons in September to 10,208 tons in May. Only two truck loads of flour were infested with beetle.

Quantities of rice shipped increased to approximately 40,000 tons, which comprised dried, dressed, vitamin, brown and broken rice. New Guinea, New Zealand, Canada, Near Pacific Islands, Europe and the United Kingdom were the main importers.

CITY MARKET AND INTERSTATE SUPPLY INSPECTIONS

Citrus Fruits.—Heavy supplies of Navel oranges of good quality were available from June to October, 1956.

The quality of Valencia oranges fluctuated during the season. Early in 1957 coastal supplies decreased, but M.I.A. supplies continued until many consignments were withheld from sale owing to low juice content.

Apples.—The majority of apples arrived from interstate. Good quality Jonathan and Rome Beauty apples came from South Australia, and the usual red varieties from Queensland. The same conditions prevailed as in the previous year concerning apples from Tasmania (first shipment in August) which were infested with European red mite were fumigated with methyl bromide before release. From a total of 229,217 cases received, 8,428 were fumigated.

Pears.—The main supply of pears arrived from Victoria. Small shipments of Winter Cole and other varieties of good quality, well graded pears, came from Tasmania.

Cherries.—The main supply came from Young and Orange districts from light crops which were late in ripening. There was little brown rot, but fruit was mainly poor quality.

Apricots.—Apricots were late in maturing and only small quantities were received from Kurradjong and coastal districts. During December and January some small consignments from the M.I.A. contained brown rot.

Strawberries.—Queensland strawberries were available from June to September. As well as the usual chip punnet container, a large quantity of unsized berries was packed in $\frac{1}{2}$ lb. and 1 lb. cardboard punnets which, in turn, were packed in cardboard cartons for forwarding. These containers proved popular with retailers.

Pineapples.—The winter crop pineapples showed considerable amount of black heart. Many consignments of the summer crop were infected with yeasty rot and blister, which caused considerable wastage.

Potatoes.—Consignments totalled 887,720 sacks from local and interstate sources, which is 323,638 sacks less than last year. State-grown amounted to 91,500 sacks, of which only occasional consignments needed treatment for potato moth infestation. The quality generally was not good, and the branding of the bags was poor. Tasmania supplied 518,900 bags, Victoria 174,182, Queensland 63,720, Western Australia 37,818 and South Australia 1,600.

Fruit Fly.—The fruit fly eradication campaign carried out in the M.I.A. has been successful, in that within this area no flies have been caught since June, 1956. Unfortunately, an outbreak of fruit fly at Ganmain, which is about 38 direct miles from the M.I.A., affected the citrus export from the Yanco section of the area. Growers of the Mirrool section of the M.I.A., however, were able to export oranges to New Zealand without treatment, as no fruit flies have been found within a radius of 50 miles from this centre for a period of twelve months.

An outbreak at Corowa on the Murray River caused some concern to both this State and Victoria, and it was necessary to provide staff to eradicate the pest in this area. It is hoped as a result of the campaign that the fly will be eradicated from the Corowa district, as on the M.I.A. Unfortunately, however, the fly is likely to be introduced again at any time.

The outbreak of fruit fly at Mildura in Victoria has affected the position of this Department, in that Victoria conducts 100 per cent. inspection of all citrus fruits at the border if these have had no prior inspection by a New South Wales inspector. Should an officer of the N.S.W. Department of Agriculture certify to having made a 10 per cent. inspection of the fruit, Victoria will allow the fruit to enter the State without further inspections. N.S.W. growers in the affected areas therefore demand inspection by officers of the N.S.W. Department of Agriculture, thereby avoiding unnecessary handling of their fruit.

In New South Wales, fruit fly campaigns were conducted during the year at Bourke, New England, Grenfell, Narromine and Hillston.

Citrus Gall Wasp.—The campaign for eradication of this pest in the metropolitan area continues, and although the wasp has been found in an increased number of suburbs, to date the Department has been successful in keeping all commercial citrus growing areas in the State free from the pest.

District Potato Inspections.—Since the dissolution of the Board, potatoes are treated in the same way as other vegetables and fruit crops; inspections are made at the markets and in the main potato areas of the State. Inspections are still carried out on behalf of Certificated Seed Potatoes (N.S.W.) Co-op. Ltd. at Crookwell, Orange and Guyra.

Prosecutions and/or Warnings.—During the year there were 107 prosecutions and 390 letters of warning issued for various offences under the Plant Diseases Act, Potato Licenses Act and Irrigation Act.

Immature Citrus Fruits.—An effort is being made to prevent the marketing of immature citrus fruits. Testing of early marketed fruit by inspectors at the point of production in co-operative and growers' sheds and co-ordination between this work and market inspections has greatly reduced sales of immature citrus fruits.

District Extension Work

Fruitgrowers throughout the State realize the value of Departmental extension services. Increased numbers of requests to Fruit Officers for information, advice and assistance in all phases of fruit production were received. In order to cope with the increased demand, it was necessary to fully employ all avenues of extension such as press and radio, group demonstrations and field days, growers meetings, film nights, personal visits and individual instructions.

Some of the district extension activities and problems upon which extension officers have concentrated during the year included:—

Murrumbidgee Irrigation Areas.—An intensified extension campaign was carried out on brown rot of stone fruits. A new list of recommended fertilisers was compiled, as was a new M.I.A. spray calendar. These were sent to every horticulturist in the M.I.A.

Murray River.—A check-up of all orchards in the Murray River district was carried out following outbreaks of fruit fly infestation at Mildura and Corowa. Farm design, spray irrigation, drainage, land grading and land use received special attention.

Orange.—During the last twelve months considerable improvement has been achieved in the Orange district in the control of black spot on apple and pear, following demonstrations by extension officers.

In view of the approaching season's heavy bud show there is considerable interest in the effects of hormone spray thinning of fruit.

Cumberland.—Since the 1956 floods, 967 acres of fruit trees have died and extensive contour surveys for planting and drainage systems were made over a considerable area.

Young.—Much attention was given to building up soil fertility in orchards by use of clover cover, and improvement in fruit size and quality was achieved through better soil management practices, pruning treatment and disease and pest control.

Batlow.—Encouragement of growers to use more economic spray programmes has continued and growers have also been encouraged to employ adequate fertilizing practices.

New England.—An improved feature in the extension programme this year has been in demonstrating the latest pruning methods to growers throughout this part of the State.

Gosford.—Interest in underground drainage continues following serious waterlogging in recent above-normal rainfall years.

Control of black spot on citrus and scale pests received special attention.

Agricultural Extension Grant.—Nine projects are conducted by the Division of Horticulture under this grant. The project for eradication of apple black spot at Yetholme continues to attract wide interest, and the services of the Fruit Packing Instructor appointed under the grant are in keen demand.

Research Orchards, Laboratories and Advisory Committees

Fruit Cool Storage Investigations, Advisory Committee.—This committee met twice during the year and reviewed the work carried on co-operatively by the C.S.I.R.O. Division of Food Preservation and Transport and the Division of Horticulture. The work embraces cool storage and quick freezing investigations at the Homebush Laboratory; mould wastage and fruit fly investigations at Gosford Citrus Wastage Research Laboratory; and investigations at the Plant Physiology Laboratory at the University of Sydney.

Fruit and Vegetable Processing Research Committee.—This committee, consisting of officers of C.S.I.R.O. Division of Food Preservation and Transport and this Department, under the chairmanship of Dr. J. R. Vickery, studied reports of all investigational work in fruit and vegetable processing at present in progress. Work on development of peaches for canning and freezing, the sulphuring of fruits for drying, freezing of apricot and peach varieties and the processing of boysenberries, were dealt with and future work planned.

N.S.W. Canning Fruits Advisory Committee.—This committee was established by the canning industry to progressively review canning fruit plantings and to make recommendations to the industry. As heavy losses of canning peach and apricot trees in the M.I.A. have upset previous calculations, the committee will be active in guiding new plantings and replantings in the interests of the industry.

Commonwealth Dried Fruits Processing Committee.—This committee has considered problems regarding rack dehydration of sultanas, sulphite dipping of sultanas, stickiness in seeded lemons and the quality of oils used in sultana dipping. Much information concerning mould control in prunes and the development of a suitable type of small consumer package has been obtained.

Joint Committee of Investigation—M.I.A. Fruit Tree Losses.—The joint committee set up by the Minister for Conservation to investigate fruit tree losses in the Murrumbidgee M.I.A. included members from the Water Conservation and Irrigation Commission, N.S.W. Department of Agriculture, Rural Bank, the Treasury, and representatives of local interests. After investigating the circumstances and effects of the wet conditions of autumn, winter and spring in 1956, the committee made recommendations for the rehabilitation and reconstruction of the horticultural industries in the M.I.A.

Bathurst Experiment Farm Orchard.—Additional valuable data were accumulated concerning apple and pear stock trials, fruit breeding, variety trials, pest and disease control, cultural treatments and pruning. New investigations include bulk handling of fruit, and removal of spray residue.

Lower Murray Research Station Orchard.—A citrus nursery has been established, with adequate irrigation facilities, together with a shade house for raising seedlings.

Extensive landscape plantings of windbreaks, etc., have been planned for next year. Preparations have been made to plant a collection of stone fruit varieties for demonstration and observation purposes. Construction of internal roads has commenced and 8 acres of land on the western end of the station have been released for use as a permanent flood levee and roadway.

Yanco Experiment Farm Orchard.—Trees of all the main clingstone varieties of canning peaches were raised this season to extend the trials in progress in the farm orchard. The 3 acres of young citrus trees planted last year on several rootstocks, in block 5, have made very good growth. Rough Lemon stock is the only one which has shown any serious effects of the wet conditions.

Gosford Citrus Experiment Station.—Although the main activity at the Narara section is fruit tree propagation, an appreciable amount of horticultural investigation is also in progress. Phylloxera-resistant grape vine stock are also propagated at this section.

Ten strawberry selections are under test at present, and 800 seedlings have been set out. A promising selection (N55/7) is now being multiplied and may later be released as a new variety.

The demand for *Pyrus calleryana* (D6) as a stock for pears increased and seeds, as well as a few worked trees of this selection, were made available to nurserymen.

Passionfruit pollination studies were continued on a more extensive scale during the year.

The Somersby section is still in the course of development. During the past three years more than 1,700 trees have been planted in citrus field trials on about 15 acres of land, and 6 acres are in the course of preparation for future citrus plantings. Further plantings this year involved 520 citrus trees consisting of an arboretum, a collection of trifoliata strains and various virus investigation field trials.

Griffith Viticultural Nursery.—Salt damage to the vineyard has worsened. Ten acres of a former experimental block were recently obtained for viticultural use.

The production of phylloxera-resistant cuttings has seriously decreased following the death of 25 per cent. of the mother vines. The only suitable land for raising vine rootlings is becoming salted and, as a consequence, the strike of cuttings was very low.

Gosford Citrus Wastage Research Laboratory.—Investigations into the control of wastage in citrus fruits were continued at the Gosford Citrus Wastage Laboratory which is operated jointly by the C.S.I.R.O. and this Department. Citrus packing houses in this State and Queensland are now using sodium ortho-phenylphenate against mould wastage under commercial conditions as recommended by this laboratory. Reports received have been most encouraging in demonstrating the effectiveness of the treatment. Work aimed at improving fruit appearance by the application of wax coatings is projected and one satisfactory wax emulsion is commercially available and others are being formulated.

An exploratory trial has indicated that post-harvest dipping of grapefruit in 2,4-D, together with wrapping in diphenyl wraps might be effective for the storage of grapefruit.

Tropical Fruits

Climatic conditions were unfavourable to growth of all tropical fruits as drought conditions prevailed for most of the year. These conditions influenced fruit quality, with much thinner fruit harvested, in general, and considerable quantities from all districts being unmarketable.

Banana Growers' Federation.—The Department continues to enjoy the complete co-operation of the Banana Growers' Federation, which has continued to support extension and research activities in every way. This Society, however, expressed its keen disappointment that greater progress has not been made with the Tropical Fruit Research Station.

Regulatory Services.—There has been an increase in bunchy top incidence in the Tweed and Upper Richmond districts, but control throughout the Far North Coast remains very satisfactory.

Banana Beetle Borer (*Cosmopolites sordidus*).—Dieldrin and Aldrin have proved extremely effective against this pest. Simplicity of application and relative cheapness of these materials appeal to growers.

The Plant Diseases Act was enforced and the Department's responsibility in directing the Diseases Control Scheme prepared by the Banana Diseases Control and Development Co-operative Ltd. was also carried out. There was a considerable increase in the area inspected because of good working conditions throughout the year.

EXTENSION WORK

The Annual Field Day at Duranbah has been postponed until 6th November, 1957, to enable it to coincide with the Annual Meeting of the Banana Growers' Federation, but other Field Days were held in different districts.

Duranbah Plot.—This plot remains popular with growers and visitors alike.

Figures for production and costs provided convincing factual data for the industry. This year, with heavy production and moderate prices, the full benefits of irrigation were demonstrated on an acre of bananas which produced 365 cases, realising a net return of £396.

Supplementary Watering of Bananas.—The use of supplementary watering continues to increase, and this drought year has done much to convince growers of the desirability of this practice. It is regrettable that capital costs for installation of irrigation are too high for the average grower.

Trends.—The total acreage of bananas was 27,774 acres, a decrease of 838 acres, and the number of commercial growers reduced by 181 to 4,709. Production was 2,156,466 cases from 26,608 bearing acres. Marketing costs are down 25 per cent. on last year's figures, due to the change in marketing from agent to merchant system.

TROPICAL FRUIT RESEARCH

A soil survey of the Research Station has been carried out by the Chemist's Branch and will permit consideration of the Research Land Use Plan for the Station and determination of projects in order of priority. A box plan for lay-out of buildings and roads has also been prepared for consideration.

Plastic Bunch Cover Trials.—Durability and improved colours studies continued. This project has reached the stage where further work should be deferred pending establishment of the Tropical Fruit Research Station.

Banana Packing Investigations.—These investigations have included (a) trial of the new fibreboard case; (b) cluster and hand packs prepackaged in polythene covers; and (c) bunch transport in polythene covers. The trials were carried out in co-operation with the Banana Growers' Federation retail depots in Sydney, so that it was possible, for the first time, to obtain reliable observations on out-turn of fruit and other relevant data at the marketing end. Results have been encouraging and the trials will be expanded.

Bunchy Top Control.—Influenced by the side effect of new insecticides used in beetle borer trials, against ants and aphids, the possibility of eradicating ants and aphids from plantations, thus eliminating the vector problem, was investigated. It was arranged to treat selected bunchy top plantations in the Tweed and Richmond River districts. This work is still incomplete and will be continued for a further season.

Leaf Spot (*Cercospora musa*) Control.—The present control programme, though effective, is too costly and too difficult for general adoption. Efforts have been commenced to (a) obtain more convenient and more effective fungicide material and (b) develop cheaper methods of application. Low volume machines such as the "Mini Micron" mist sprayer and "Swing-fog" machine have been under trial. Time of application trials covering the period November to March and the testing of eight new and improved fungicidal materials are being carried out at the Duranbah Plot.

MISCELLANEOUS TROPICAL FRUITS

Miscellaneous tropical fruits investigations have continued.

Macadamia Nut.—Improvement work has progressed in the processing field. New and attractive confections have been developed with the nuts. Propagation and nursery work at

Duranbah is under way. It is important that reputable strains be developed and made available through nurserymen but this seems still a long way off. However, selected seed is now available to farmers for planting clumps on their properties until such times as grafted trees are available for grove plantings.

Passionfruit Pollination.—Pollination studies have been extended at the Gosford Citrus Experiment Station, and the information on pollination obtained has been prepared for publication.

Passionfruit Seed Germination.—The seed germination experiments have shown that the problem is more complex than first envisaged. Nevertheless, the information that storage of seed in the entire fruit is more reliable than storage of seed in the cleaned state is of immediate practical value.

POME FRUITS

Seasonal conditions generally adversely affected the crop. Wet conditions and below-average mean temperatures continued through the spring, while dry conditions prevailed for the remainder of the year. Though few trees have died as a result of last year's record rainfall, a considerable number has been adversely affected by more or less root injury. The effect of the prolonged period of dry weather following the previous abnormal wet period is mainly apparent in loss of vigour. If better growing conditions are experienced during the next year or two, and provided the trees are pruned and fertilized, they should largely recover. Severe localized damage was caused by hailstorms in the M.I.A. and the Hills district.

Following last year's heavy crop, it was anticipated that this year's apple crop would be well below average. Adverse weather conditions at flowering, including very heavy frosts, affected setting and fruit size. It is estimated that the total apple crop will not exceed 850,000 cases, as against some 2,000,000 cases last season.

The prospects for pears in the early part of the season appeared to be reasonably good but, as with apples, the dry weather and heavy frosts at Batlow (which is one of the three main producing areas), reduced the crop to less than last season's figure of 350,000 cases.

Owing to the dry season the keeping qualities of apples and pears being cool stored should be much better than those of last season.

Following the very satisfactory export of last season's trial shipments of early Granny Smith apples from the M.I.A., further small shipments from that area, and also from Oakdale, were forwarded this season. The first shipment of some 4,000-odd cases was shipped on 3rd March, and a further consignment left Sydney on 8th March. Although this fruit was somewhat immature, it brought 50s. to 55s. per case. A small trial shipment of excellent quality Jonathans also left Sydney on 8th March, but owing to competition on the London market realised only 40s. to 45s. per case.

It is considered that there is limited room for expanding the early shipment of Granny Smith apples from the M.I.A., Oakdale, and Stanthorpe in Queensland, but the fruit should not be shipped in a too immature condition.

POME FRUIT EXTENSION

Owing to the dry summer and autumn, codling moth was more prevalent than at any time during the past few years, whilst red spider and Bryobia mite were extremely troublesome and involved growers in considerable expense. However, in general, pests and diseases have been reasonably controlled.

Cool Storage.—Fruit cool storage capacity throughout the State shows an increase of approximately 59,000 cases. The total storage capacity in the Orange district is now 389,000 cases.

At Bathurst the local dairy factory has added a further room to its stores which, together with several private growers' stores, provide the Bathurst area with a total storage capacity of 40,000 cases.

Spray Equipment.—Through the Commonwealth Farm Mechanisation Research Vote two new-type spray units were obtained from England. They are designed for extremely low volume application of sprays and were used at Batlow in an experimental and demonstrational capacity.

Simplicity of one of the machines aroused marked interest amongst the fruit-growing community.

Bulk Handling of Fruit.—A tractor front-end fork-lift was also obtained and is at Bathurst Experiment Farm, to help investigate bulk handling of fruit from orchard to packing shed.

TRENDS

Planting.—Fewer young trees were planted and these were confined mainly to Orange, Batlow, New England, Bilpin, Oakdale and the M.I.A.

A steady decline is expected in pome fruit production in the Young district. Some of the less productive plantings are being destroyed each year, and practically no new plantings are being made. Similar conditions prevail at Penrose, Tal-long, Goulburn, Hartley, Bathurst, Capertee, Lavington, etc., 94 per cent. of all non-bearing trees are planted in the six main districts. As these areas are, by reason of soil or climatic conditions, best suited to the production of quantity and quality, the present planting trend is generally advantageous.

Fibreboard Cases.—Considerable earlier prejudice, mainly on the part of agents, is slowly being broken down as it becomes obvious that these containers show several advantages over the wooden box—particularly in relation to protection of fruit from bruising. Apart from reducing bruising, the cartons reduce labour requirements in making and fastening less storage space is required and there is no need for protection by strawboards, etc., and initial cost is less.

A trial shipment to England from Tasmania evoked very favourable comment. Increasing interest is shown also in the rapid development overseas of automatic packing devices in conjunction with the use of trays and cell packs.

Supplementary Watering.—A number of orchard water storage projects are either completed or in hand, to provide supplementary watering in the Orange and Oakdale districts.

POME FRUIT RESEARCH

Pre-harvest Drop Controlling Sprays.—The chemical 2,4,5-TP has almost entirely superseded the standard N.A.A. in most apple districts. In early coastal districts unfavourable effects on early varieties have been reported, but are unconfirmed. N.A.A. is still used for pears, and a recent trial showed that when applied in semi-concentrate form N.A.A. is superior to 2,4-D and there were no harmful effects on storage quality.

Chemical Thinning of Apples.—The season being one of light crops limited trials only were conducted. It is expected that chemical thinning will be used widely this coming season.

Urea Sprays.—Sprays of urea have given improved foliage and crops on trees lacking nitrogen, but have given variable responses in other instances.

Apple Storage.—Experiments on "gas" storage of apples have yielded basic information on the effect of various concentrations of carbon-dioxide and oxygen on superficial scald.

The important scald disorder of Granny Smith and other green varieties has been treated by chemical inhibitor diphenylomine which has been found to be very effective either as a dip or an impregnated wrap.

Pear Storage.—This project is being carried out in co-operation with C.S.I.R.O. Storage of pears in sealed polythene bags has increased the storage life from six months to eight months.

A partial control of blue mould of Winter Cole pears has been obtained by dipping the fruit in low concentrations of sodium ortho-phenylphenate. Experiments with higher concentrations are continuing.

Rootstocks.—The main planting of rootstock trials is at Bathurst Experiment Farm, although a number of indicator plots are located in private orchards in the State. The plantings at Bathurst Experiment Farm comprise various seedling stocks, imported clonal types and Northern Spy, and the majority have now been cropping for twenty to twenty-one years, during which time accurate crop data relating to quantity and quality have been kept, as have measurements of tree growth. The information obtained was published in Horticultural Research Record No. 1. Plans are now under way for a further series of stock trials which will include a new series of clonal types from England as well as several promising local clones raised as a result of cross-breeding work and rigid selection of types.

Apple and Pear Breeding.—Further testing of selected cross-bred apple and pear seedlings has resulted in several being rejected.

Stone Fruits, Berry Fruits, Dried Vine Fruits, Nuts and Miscellaneous Fruits

The 1956-57 season ranged from extremely wet in the winter and spring to drought conditions in summer and autumn.

Waterlogging and related troubles caused considerable losses in stone fruit trees. Forty-five per cent. of peach plantings and 34 per cent. of apricot plantings in the M.I.A. were lost, and in the State as a whole over 260,000 stone fruit trees have been either killed or seriously affected by the wet conditions.

Seasonal conditions caused slow development of vine fruits for drying. At the beginning of the drying season grapes were not mature and sugar content at harvest was low. Currants were damaged by heavy rains in February. About half of the crop of currants was lost and that harvested was of poor quality.

Sultanas marketed as fresh grapes sold well when properly presented, and growers in Mid-Murray districts exploited this market.

All available apricots and peaches produced in the M.I.A. were taken by the canneries. Loss of trees due to the extremely wet conditions last year reduced production of these fruits, and competition for the crop was keen.

EXTENSION WORK

A conference on brown rot was held at Leeton in August and subsequently the control of this disease received special attention, particularly in the spring period, in an intensive campaign in the M.I.A.

Two Field Days were held to allow growers to appraise the new canning peach varieties under trial.

In the Young district the value of clover for improvement of orchard soils has been demonstrated at field days and more fruit growers are now making use of clover.

A campaign to control black spot and downy mildew was conducted in Murray River districts. Field Days were held at Coomealla, Merbein and Woorinen and demonstrations of pruning and care of young vines were carried out.

In Mid-Murray districts demonstration plots of apricots, prunes, plums and peaches have been established by the District Fruit Officer and will be used to demonstrate the growing and handling of these fruits. This is necessary, as many growers wish to change over from vines to stone fruit growing.

Many pruning demonstrations have been staged.

TRENDS

Soldier settlement in the Lower Murray area of New South Wales is now completed and nearly all blocks are approaching full production. A new irrigation scheme near Buronga is now open for application.

A stabilisation scheme for sultanas and currants has been accepted by the Commonwealth Government and is now before the growers for ratification.

Good progress was made in rack dehydration for dried vine fruits, and plants are now more efficient.

In the Lower and Mid-Murray districts increased interest is being shown in stone fruits.

Losses in prune trees in the M.I.A. due to weather conditions were not very great. The percentage of younger plantings in production is increasing, and as these produce better quality fruit, the over-all quality of the crop on the M.I.A. should improve. Planting rates are sufficient to offset removals. It is possible that plantings of prune trees in the M.I.A. will temporarily increase as 1956 losses are made up. Prune trees might be favoured because of the natural resistance of the plum to waterlogging and root rots.

Heavy losses of peach and apricot trees occurred in most of the important stone fruit growing areas, but in most places will eventually be made good.

Considerable interest is being shown in the newer, earlier-ripening varieties of peaches.

Unfortunately, many young apricot trees were lost and production of apricots will therefore be reduced.

It is estimated that 10,000 cherry trees (approximately 7½ per cent.) have been lost in the Young district. Consequently, crops of cherries may be lighter than was anticipated. Much interest has been shown by growers in Young and Orange in the new cherry varieties released by the Department.

Cardboard containers for cherries and other stone fruits are under trial.

RESEARCH WORK

Plum and Prune Stock Trials.—Plum and prune stock trials are located in appropriate districts. In practically all areas stock-scion combinations using Buck plum (PH5) stocks have grown faster and cropped better where other Myrobalan and Marianna stocks are used.

Prune Fertiliser Trials.—All prune fertiliser trials being conducted at Young have produced increased yields. Blood and bone proved best, but cost might deter growers from using similar amounts. Annual applications of 20 lb. blood and bone per tree have produced yearly average increases in yield valued at £14 14s. per acre above cost of fertiliser used. A complete mixture, providing an equivalent amount of nitrogen gave an annual average increase of £12 14s. per acre above cost.

Harvesting Maturity of Prunes.—Investigations are in progress in an endeavour to fix an optimum period of harvesting. As it is impracticable to handle the whole crop at the optimum stage of maturity, an earlier start than usual should minimise the deterioration in quality that occurs late in the season. Drying tests of early harvested fruit indicated that harvesting could commence a little earlier, but showed that substantial weight loss and poorer quality results when harvesting is commenced too early.

Peach Pruning and Thinning.—Summer pruning treatment is being tested on an area of 7-year-old Wight peach trees in the M.I.A. in an effort to improve the type of fruiting laterals produced. The treatment given was the same as that used in summer pruning of apricot trees in the M.I.A. The results are quite promising and treatments are to be continued.

Chemical thinning experiments have continued, and "Ala-nap" shows distinct promise.

Canning Peach Varieties.—In view of the need to replant many orchards, much interest is being shown in the newer varieties under test. In the variety trial, Vincent was promising as an early maturing variety; Stanford and Sullivan for mid-season (although Fairless yielded well), whilst Windra proved the best late-maturing variety. Seven of the introduced crossbred peach selections have shown promise.

Peach Development Studies.—Fruit development work was carried out in co-operation with C.S.I.R.O. Division of Food Preservation. Data on developmental factors of J. H. Hale peaches have been obtained.

Fruit Storage—Freezing of Peaches.—This work (in co-operation with C.S.I.R.O.) has shown that several freestone peach varieties, in particular J. H. Hale, are suitable for freezing. The Blackburn-Elberta variety was generally unsatisfactory. Ascorbic acid content of the product was studied. Similar work with berry fruits is in progress.

Stone Fruit Variety Trials.—Locally raised and introduced varieties of peaches, nectarines, apricots and plums are under trial in private orchards and Experiment Stations in all main fruit growing districts.

A number of stone fruit trials have been commenced in various localities of the Gosford district. This work is to gain information on the possibilities of early stone fruits in the reconstruction of declining citrus orchards in the district.

Olive Trials.—The unusual season caused patchy cropping and poor growth in Sevillano and Manzanillo trees. The Corregiola carried a reasonable crop, but fruit was small and tree growth poor. Crop records have not yet been taken, but trunk measurements show that growth differences occur which may be due to stock influence.

Almond Seedling Selections.—The almond selection W3 which is being tested with Hatch's for quality and pollination compatibility produced a greater weight of kernels than did Hatch's. However, the seedling was again unreliable as a pollinator for the standard variety.

Effect of 2,4,5-T on Apricots.—Experiments have continued with concentrations up to 50 p.p.m. The sprayed fruit of several varieties matured a week earlier. The extent of damage caused to foliage, fruit buds and seeds requires further study.

Internal Breakdown of Apricots.—Under experimental conditions the extent of internal breakdown was found to increase with increasing rates of sulphate of ammonia application and was aggravated by heavy watering as the fruit matured. Yield and fruit size were only slightly increased by the sulphate of ammonia treatments.

Strawberry Investigations.—Object is to develop virus-free varieties of high commercial quality. Some 500 seedlings were planted.

A number of strawberry plants which were subjected to a heat treatment to remove virus infection were planted at Bathurst for multiplication and observation.

Trials for chemical control of weeds in strawberries continue.

Fruit Tree Propagation.—Tests are in progress to compare rubber strips with plastic film for budding purposes.

Pecan Nuts.—Variety testing continued and fruiting studies were commenced.

Citrus Fruits

Heavy tree and crop losses resulted in most areas due to soil conditions associated with *Phytophthora* root rot due to abnormally heavy rainfall.

In the Gosford district some 200,000 trees out of 1,000,000 trees planted have either died, or declined in health below economic level.

In the Cumberland district about 96,700 trees have been "written off".

Forty-five thousand citrus trees were adversely affected in the M.I.A. while in the Lower Murray area approximately 12,000 trees were similarly affected.

As a result, production losses will be considerable, as most of the trees lost were mature.

A relatively large crop, estimated at 4 million bushels, met exceptional difficulties on the marketing side.

Outbreaks of fruit fly at Mildura and Corowa prevented growers within a fifty-mile radius exporting citrus to New Zealand. This also applied to Yanco Irrigation Area because fruit fly was found at Ganmain. Except for a limited European market, supplied by coastal growers, all fruit had to be placed on local markets. Prices realised were poor and prospects for expanding the European market are not good.

EXTENSION WORK

Pest and Disease Control.—Black spot disease caused serious fruit losses where adequate control sprays had not been applied the previous year. This disease threatens the Valencia orange trade in coastal districts.

Fruit fly eradication campaigns were conducted at Corowa, Ganmain and Hillston.

A new method for red scale control in the M.I.A. involved a 0.1 per cent. Malathion plus 1 per cent. white oil spray treatment with a corresponding reduction in fumigation.

The new method of controlling white louse by adding coloidal or wettable sulphur to the first Bordeaux spray in the spring has been quickly adopted by growers.

The most serious disease of citrus in this State is *Phytophthora* root rot, which has caused the decline and/or death of many trees.

Sale of Immature Oranges.—The marketing of immature oranges by growers wishing to share in the high prices usually paid in the May-June period was given special attention by inspectors in the city and country with singular success. This action assisted in maintaining buyer confidence and helped reduce the price fluctuations often seen at this time of the year.

Spray Plants and Fumigation.—The trend away from fumigation with hydrocyanic gas and towards spraying continued this year. Although fumigation is still considered best for scale control, high labour cost, labour shortage for this class of work and weather vagaries affecting operation militate against it. Interests in modern spray plants continues, especially in high pressure, high volume types allowing "drive past" spraying by one man. Slight loss in control is offset by better timing of applications and economy in labour.

Drainage.—The benefits derived from deep draining (as carried out in the M.I.A.) are evident on many properties. Underground draining in coastal districts has also shown benefits, and has been given special attention by Fruit Officers in all districts.

Soldier Settlements.—Fruit Officers have continued to serve on Advisory Committees functioning, in respect of Soldier Settlements at Coomealla and Ellerslie in the Lower Murray-Darling area.

Salting.—The rise in water tables in irrigation areas following the abnormal rains and high rivers of last season has contributed to salting—with accompanying tree injury. However, the position showed some improvement as water tables dropped during subsequent dry weather.

TRENDS

Production in the Gosford and Parramatta districts has declined sharply and little recovery appears likely, as the area now out of production exceeds that of new planting.

New planting was severely restricted in all districts because wet weather had prevented land preparation.

Lemon plantings in coastal districts are reduced due to poor returns in the past two seasons.

Similarly, grapefruit is losing favour in all districts except the Lower Murray and at Narromine.

The need for improved fruit quality is becoming evident in the M.I.A. through increasing competition from the Lower Murray area and South Australia.

Increased citrus plantings continue in the Lower Murray area with one new irrigation area—Buronga—proceeding with the allotment of 27 blocks, while two further irrigation areas—Paringi and Mourquong—are in the initial stages of development.

Propagation.—P.V.C. plastic film strip for tying buds has been widely adopted in commercial nurseries. It is easy to use and overcomes difficulties of poor bud “takes” in damp seasons.

Co-operative Citrus Bud Selection Society.—Assistance was again rendered to the Society for providing inspectional service under the Parent Tree Registration Scheme. Assistance in locating sources of bud supply was also rendered. Bud yield from the parent trees planted on the Society's behalf at the Narra section of the Gosford Citrus Experiment Station was again disappointing due to drought conditions and lack of irrigation. The Society again provided the fertiliser requirements for this planting without return.

Citrus Varieties Imported and Exported.—During the year Trifoliata and Late Valencia citrus seed was supplied to the United States Department of Agriculture, the Department of Agriculture, Ceylon, and the Department of Agriculture, Pakistan.

RESEARCH WORK

Fertilisers and Soil Amendments.—At Yanco Experiment Farm a heavy dressing (30 lb. per tree) of superphosphate to orange trees has improved skin quality and rind thickness of the fruit, whilst also reducing juice acidity but increasing juice content. The possibility of obtaining these effects by foliar sprays of phosphate is being investigated.

The value of lime for correcting soil acidity and the comparative value of urea and sulphate of ammonia as sources of nitrogen are other subjects under study.

Rootstock Trials.—Rootstock trials have been established at Yanco Experiment Farm and at Gosford Citrus Experiment Station. Navels on several rootstocks were planted in old orchard land of moderately heavy type at Yanco Experiment Farm to assess the usefulness of soils of this type for citrus replanting. Trees on the Trifoliata and Citrange rootstocks survived the flooding in the winter of 1956, whereas those on Rough Lemon stocks invariably died. Trifoliata is proving superior to Citrange as a stock, but there is as yet no difference between the strains of Trifoliata or between the varieties of Citrange.

Valencias on several rootstocks have been planted in old orchard land at Gosford Citrus Experiment Station to assess the possibility of growing citrus on old orchard land in coastal districts.

The Navel and Valencia rootstock trial at Narara section of Gosford Citrus Experiment Station, using two strains of Rough Lemon and Sweet Orange, was finalised.

Citrus Seed Extraction and Storage.—The economic aspects of citrus seed extraction, and influence of extraction method on storage behaviour and germination capacity, have been studied at Gosford Citrus Experiment Station. Storage methods are also being investigated. Results so far indicate improved germination for aerobic rotting of the fruit as against anaerobic rotting though labour costs favour the latter method.

Storage of Trifoliata seed at 41° Fahr. has also shown advantages in preserving viability in the seed.

Citrus Fruit Development Studies.—Research into the development of citrus fruits as influenced by the presence or otherwise of leaves on the blossom shoot has been continued. Results to date suggest that leafy shoots set a greater percentage of fruit to blossom than do leafless twigs.

Citrus Nutrition.—In co-operation with the Biological Branch, investigations into citrus nutrition have commenced with the establishment of 104 Valencia orange trees on Trifoliata stock in large concrete containers. Facilities for water supply and water distillation have been provided, and the effect of certain fertiliser treatments on tree growth and yield will be studied.

Citrus Improvement Committee's Activities.—This Committee is to investigate the problem of *Phytophthora* root rot, and virus diseases. Investigations in progress include—

- (a) Orange varieties for freedom from scaly butt virus.
- (b) Collection of Trifoliata selections.
- (c) Transmission of scaly butt virus by bud insertion.
- (d) Determination of relationship of stunting to scaly butt.
- (e) Seedling transmission of scaly butt virus.
- (f) Mandarin decline virus.
- (g) Stem pit virus in grapefruit.

Wine and Table Grapes

WINE GRAPES

Although production was not high, the 1956-57 season was the best for three years, both in quantity and quality of the final product.

In the M.I.A. the spring was wet and humid, causing outbreaks of downy mildew and black spot. Vintage conditions were excellent. The combination of clean grapes and ideal weather favoured the production of good quality wine.

An outbreak of dead arm disease, the first in New South Wales, occurred on wine and table grapes at Griffith.

The Hunter Valley area enjoyed an excellent season. A few minor outbreaks of downy mildew occurred in December, and dry conditions which prevailed throughout the growing season caused some distress to vines approaching maturity. In many cases the berries were somewhat pinched.

Vintage conditions were good, although the threat of rain caused some growers to pick before the stage of optimum sugar content.

Total production of wine grapes from the M.I.A. for the 1956-57 season was 17,467 tons, as compared with 12,770 tons in 1955-56, 11,312 tons in 1954-55 and 25,000 tons in 1953-54. An additional 1,611 tons were brought into the M.I.A. from the Murray irrigation districts to augment local production. Two hundred and fifty tons of wine grapes left the area to be processed elsewhere.

Prices paid by M.I.A. wineries per ton of grapes increased by £1 10s. to £2 for all varieties except Black Shiraz, the price of which was raised by £5. Growers remain dissatisfied and maintain that cost of production still exceeds returns.

Some small areas of wine grapes have been removed from the M.I.A., and practically no replanting has been undertaken or is contemplated.

Yields from most vineyards in the Hunter Valley exceeded last season's and it is estimated that 1,100 tons were processed this year as against 945 tons for 1955-56.

The amount of replanting in this district has been slight and is only being undertaken by a few of the larger firms with interests elsewhere. In a survey made last year it was ascertained that only about 160 acres would be replanted during the next five years.

TABLE GRAPES

Conditions were ideal for table grapes in all districts. The weather, particularly in the County of Cumberland, was excellent, and the season was characterised by the absence of disease. Yield of good quality fruit was the highest for some years.

Judging from the orders of *Phylloxera* resistant rootstocks, the area to be planted with table grapes in the County of Cumberland will be slightly higher than in 1956.

EXTENSION

Requests for information on grape growing were numerous. The Fruit Officer (Viticulture) made frequent trips to wine and table grape districts advising on such matters as disease and pest control, pruning, cultivation, rootstocks, etc.

Wine Making.—Requests for information on wine making were quite numerous, especially from the smaller makers.

At the Oenologist's laboratory at Griffith Viticultural Nursery the Fruit Officer (Viticulture) during visits to the M.I.A. made analyses of over a hundred different wines submitted to him by makers. Advice concerning their subsequent treatment was given where required.

RESEARCH

Experimental Wine Grape Planting.—The first major crop from the experimental wine grape planting at Molong was picked this year. The grapes were processed at Minchinbury Cellars at Rooty Hill into a claret type (dry red) wine, approximately 100 gallons being produced.

Although it is too early to draw any conclusions regarding quality of the wine, the chemical analysis and present condition indicate that it will be very satisfactory.

Fungicidal Spray Trials.—Officers of the Division actively co-operated with the Biological Branch in conducting several fungicidal spray trials, both on the coast and inland. Nine different fungicides were tested for downy mildew control, but the season did not favour incidence of the disease.

Results concerning the effects of each spray on vine foliage, however, proved of value.

Vine Fertiliser Trials.—In association with the Chemist's Branch two major-element fertiliser trials were laid out for table and wine grapes in the County of Cumberland. Uptake of fertilisers as judged by foliar analyses and yield responses are being tested. No significant responses in yields were noted this season.

Suspected minor-element deficiencies were investigated. Pilot trials to test responses to boron, magnesium and zinc, have been laid out in the respective vineyards.

To obtain an indication of the normal nutrient level in vines, carefully selected leaf samples from N.S.W. and S.A. were collected and submitted to the Chemist's Branch for analysis. Results should provide a guide to tracing nutrient deficiencies as they arise.

Rootstock Trials—Table Grapes.—Grafted vines are being raised for the planting out of two rootstock trials for Black Muscat table grapes in the County of Cumberland in 1958. Eight rootstocks will be tested on two distinct soil types.

Ripening of Black Muscats.—Hormones were used in experiments last season to improve the evenness and speed of ripening in Black Muscat table grapes. Failure of bunches to ripen has caused much concern amongst table grape growers for several years. Contrary to expectations, however, the hormones 2,4,5-TP and 2,4,5-TA appreciably delayed maturity. Sugar and acid analyses of bunches indicated restricted photosynthetic capacity of vines which fail to ripen their fruit normally and bunch thinning experiments are planned for next season to substantiate this view.

Chemical Weed Control.—Applications of "Dalapon" to control Johnson grass in vineyards was tested on the coast. The chemical showed promise, but the control effected was unsatisfactory. The trials are to be repeated with variations to the strengths and time of application.

Decline of Vineyards.—The serious decline of wine grape vineyards at Corowa, Rooty Hill and in the Hunter Valley is being investigated. There is a strong suspicion that a specific virus disease is responsible for a large proportion of the decline.

Phylloxera RESISTANT ROOTSTOCKS

The sales of *Phylloxera* resistant rootlings during the 1956 planting season amounted to 36,576, which returned to the Department £681 6s. 4d. In 1955, 38,565 rootlings were sold, while orders for the current year already amount to 42,100. The price for rootlings has been raised by 50 per cent., bringing the price per thousand to £22 10s.

Decline of mother vines due to salt damage at Griffith Viticultural Nursery has become much worse during the last year. Production of cuttings has fallen sharply—in 1955, 120,000 were made as compared with 86,500 in 1956. It is estimated that this year only 60,000 will be made.

The area of land available for raising rootlings is steadily diminishing owing to salting.

Decline of mother vines at the Gosford Citrus Experiment Station, through old age, is also appreciable.

Land is being prepared at Yanco Experiment Farm for the planting of 3½ acres of mother vines this winter. The old Muscat Gordo planting has been removed to allow all the vines to be located in one block and to allow completion of the operation speedily and with minimum cost.

At Gosford Citrus Experiment Station a half-acre block of mother vines was replanted in 1956 and another half-acre block will be replanted this winter.

When all the abovementioned plantings are in full production they should supply sufficient cuttings to satisfy all demands.

FRUIT PACKING—EXTENSION SERVICE

Organised demonstrations and individual instruction have been undertaken in all major fruitgrowing districts, together with talks illustrated by photographic slides on the harvesting and marketing of fruit.

As well as giving fruit harvesting and packing instruction the Packing Instructor carried out investigational and experimental work into the development of new and improved types of containers for fresh fruit.

As substitute containers for fresh fruit are developed, tremendous possibilities are envisaged for improving packing and marketing of fresh fruit.

Through September and October a concentrated effort was made to improve the packing and marketing of tomatoes, with particular emphasis on the areas which supply tomatoes interstate.

The need for packing instruction among stone fruit growers is still very real and owing to the relatively short season it is a problem to cover all districts during this period. Investigations were carried out to help develop a fibreboard case suitable for marketing cherries. This work should be concluded next season.

During January competitive fruit packing classes were conducted in the Gosford citrus growing areas. These classes were held in conjunction with the Junior Farmers' Clubs in the district. In all, 58 club members participated.

Fruit packing classes have been organised at Bathurst and Orange and attended by students from Scots College at Bathurst and the Rural School at Orange. These classes are filling a real need in these areas, as skilled packers are few.

Assistance has also been rendered in conducting cold storage trials with fibreboard cases and polythene film box liners for apples and pears.

DIVISION OF ANIMAL INDUSTRY

Veterinary Staff Position

There has been no real improvement in the staff position during the year. The net effective strength of veterinary officers was increased by one, whilst the net strength of veterinary inspectors was only maintained, although there were five new appointments.

The work of staff, however, increased about 25 per cent., due to reorganisation of veterinary inspectors' duties, by which it was possible to obtain a better cover in disease control and investigational activities. This rearrangement, which makes better use of existing veterinary services, is, however, only a temporary measure to provide a more efficient service over certain parts of the State with the staff available. The position is fluid, and if staff is not acquired, will change materially, adding further burdens to staff.

Incidence of Disease

The seasonal conditions evident at the close of last year continued for the first three or four months of this year, but then a profound change occurred. Apart from a little rain in February, the rest of the year was exceptionally dry, with no relief until the last few weeks in June. Consequently, hand-feeding became prevalent, particularly in the southern tablelands, the Hunter Valley and parts of the central west. Dry conditions have prevailed also on the north coast where hand-feeding was fairly general, though quantities fed were not extensive, owing to the bulk of dry feed available there. The dry spell was particularly helpful in control of internal parasites of sheep, also in the great improvement in the clinical

position of footrot, foot abscess and scald. At the same time, the dry spell made the incidence of pregnancy toxæmia more widespread than usual.

The year was notable for an extensive outbreak of pleuro-pneumonia, in addition to a few minor outbreaks, for an increase in incidence of trichomoniasis and leptospirosis in dairy cattle, and in avian monocytosis, and for the subsidence of the ephemeral fever epizootic which was so spectacular during the previous year.

Pleuro-pneumonia Contagiosa.—The main outbreak of pleuro-pneumonia contagiosa, which was under control last year in the Hay and Deniliquin districts, was for the most part eradicated during the year. The property responsible for the outbreak, where conditions were so bad, is still under quarantine and likely to remain so for the next few months. Part of the herd has been bled out, but unfortunately the system of husbandry practised does not enable the tested and untested cattle to be segregated, and it seems probable that all cattle on the property will have to be bled again. The remainder of the properties concerned in this outbreak have been released from control.

Another extensive outbreak of pleuro-pneumonia was detected in the Cowra district in January, which eventually involved ten Pastures Protection Districts in the central west and Riverina. A total of 159 properties were placed in quarantine and cases were detected on nineteen. Over 10,000 cattle were involved. Approximately 100 cattle died or were destroyed in the outbreak.

At the close of the year, cattle on most of the properties concerned had been bled and the reactors destroyed. Lesions were detected in most of them, bearing out the valuable assistance given to control of this disease by the complement fixation test.

In the Armidale district, a mob of cattle in which were a number of active cases of pleuro-pneumonia when they were presented to the border inspector at Wallangarra, was subsequently allowed to proceed by rail to Tancred Bros. abattoir at Tenterfield, where 624 animals were slaughtered. There were no involvements either on the Queensland or New South Wales sides from any contact at Wallangarra.

In the Tamworth district, a further outbreak of this disease was detected involving about 720 cattle. On one property, ninety-four of these were bled out and fifteen reactors were detected. Of these twelve were positive cases on post-mortem examination and the owner elected to kill the remaining seventy-nine animals and eight in-contacts which were running with them. Of the outbreak mob, twenty-five had lesions on post-mortem examination and two of the eight in-contacts also had early lesions. These cattle had been negative to the complement fixation test fourteen days previously. They were portion of a mob of 228 which were introduced at Wallangarra just prior to the outbreak being detected. The remainder fortunately stayed in the Tenterfield district, and when they were bled, twenty reactors were detected, eighteen of these showing lesions on post-mortem examination. There was no extension in the Tenterfield district and the outbreak was relatively easy to control. However, there was one extension in the Tamworth outbreak to cattle on a property adjoining the outbreak mob. This necessitated vaccination of a further 123, after which there were no further complications.

In December, suspicion was cast on a mob in the Wialla district, but bleeding failed to reveal any extension. A similar position occurred in the Cumberland district when some cattle were kept under observation for several months without showing any further evidence of infection.

Anthrax.—There were twelve outbreaks of anthrax during the year—a reduction in the number recorded for the previous year. Below are figures in respect of sheep, cattle, pigs and goats:—

	No. involved	Deaths
Sheep	15,435	313
Cattle	473	4
Pigs	43	11
Goats	1	—

Two outbreaks occurred in the Carcoar district where anthrax has not been noted previously. Mortalities occurred in pigs which were fed the carcase of a cow which had died suddenly. Pigs and dogs injected with penicillin made a good recovery from the disease, with one exception. One of the outbreaks occurred in the Moree district when a similar happening occurred, the carcase of a cow being fed to some pigs and dogs. Four of the pigs and three of the dogs died and a neighbour also lost two dogs which had had access to the carcase. Two sucker pigs treated with penicillin recovered.

Infertility in Dairy Cattle.—This condition is a major problem of the dairy industry. Cases of infertility investigated during the year included trichomoniasis, vibriosis, brucellosis, leptospirosis, vaginitis and non-specific infertility. Conclusions which can be drawn from the year's work are:—

- That the appointment of an officer to investigate the subject in the field is extremely urgent.
- That there is a very great need for better diagnostic methods to be made available, especially in suspected cases of vibriosis.
- That there is insufficient Strain 19 vaccination being carried out.
- That leptospirosis has emerged as a significant cause of abortions in cattle on the north coast.

1. **Trichomoniasis.**—Fifteen new outbreaks were detected during the year, the majority in the Cumberland district. Several of these were inter-related. Fifteen properties were released from quarantine following successful application of control measures. Unfortunately, one of the new outbreaks was detected in the Artificial Stock Breeding Centre, Aberdeen. This necessitated check-mating of all bulls at the centre, using virgin heifers. This work was in progress at the close of the year.

2. **Vibriosis.**—Vibrio-like organisms were recovered from several outbreaks of infertility, the history of which resembled vibriosis. In these cases, vibrio-like organisms were seen on smears but could not be recovered on culture. The abortions which occurred ranged up to six months. In the Cumberland area, the disease was confirmed on two properties.

On the north coast it was suspected to have resulted in early abortions up to four months' pregnancy, with resulting infertility, irregular returns to service and, on occasions, vaginitis. It is interesting to note that although specimens were forwarded to the Research Station, on no occasion was the organism recovered or seen on direct examination. Field diagnosis of this condition therefore is most difficult, and it can usually only be suspected as the cause of the trouble. Where the history and symptoms indicate that vibriosis is a possible cause, treatment with streptomycin by intra-uterine infusions, combined with streptomycin preputial washings, with or without intra-muscular penicillin treatment of bulls, has resulted in a much improved conception rate. This is a further pointer to the presence of the disease in these herds. It is frequently noted that brucellosis is a complicating factor in infertility problems suspected of being due to vibriosis. It is not likely that there is any specific connection between the two conditions, but merely that brucellosis is so prevalent in the areas.

3. **Brucellosis.**—As mentioned above, brucellosis was frequently a complicating factor in infertility suspected of being due to vibriosis. Apart from this, several investigations into abortion problems were carried out in all parts of the coast where the trouble was primarily due to brucellosis. It is difficult to understand why stockowners will not avail themselves of the benefits of Strain 19 vaccination when the infection is so widespread. Statistical information on the free-herd scheme is given later in this report.

4. **Leptospirosis.**—The increased incidence of leptospirosis reported last year continued during 1955-56. Considerably more diagnoses of this disease were made than during the previous year. Diagnosis was based particularly on the agglutination test which, of course, may be a source of error, owing to the persistence of the agglutinins in the blood stream after exposure. The syndrome of unthriftiness in calves and chronic symptoms in adult cattle reported in the areas undergoing eradication for cattle tick continued during the winter. In addition, a number of abortions were suspected of being due to leptospirosis, confirmed in one case by the isolation of *L. pomona* from the aborted foetus. The field evidence of abortions due to *L. pomona* being responsible for a significant proportion of infertility problems is strong. Antibiotic therapy, using particularly streptomycin, is the only method by which attempts to control the disease are made. The significance of this treatment is difficult to gauge, however, owing to the sporadic appearance of the disease in affected herds.

5. **Vaginitis.**—Two types of vaginitis were investigated, one being the usual granular vaginitis, and the other a somewhat virulent vaginitis which develops within one to seven days after service with an infected bull. There is a creamy or yellowish discharge in the vagina within this period after service, and where present in the herd, the condition results in returns to service at irregular periods up to four months. The consensus of opinion is that at least some of these cases may be due to vibriosis. Two methods of control have been tried, both of which have given reasonable success. The first involves disposal of the bull and sexual rest for the herd for three months; the second, the use of streptomycin vaginal and

cervical douches, with streptomycin and penicillin treatment of the bull as reported previously under vibriosis. It seems that this problem is becoming more acute in the dairy industry.

6. Non-specific Causes of Infertility.—These include lowered bull fertility and anoestrus due to seasonal or nutritional disorders. The latter conditions are quite common during dry spells. With regard to lowered bull fertility, it is interesting to note that several cases were reported in bulls which had survived severe attacks of ephemeral fever during the epizootic which occurred last year. It is not possible to state that infertility in these animals is due to permanent effects of the fever.

Avian Monocytosis.—During the year a very marked increase was detected in incidence of this condition in poultry. No statistics are available, but it is evident from reports received from the Director of Veterinary Research that this condition was responsible for extensive and widespread losses of poultry during the year. Mortality rate in one outbreak, which was complicated by concurrent infections and vitamin deficiency, reached almost 100 per cent. The financial losses, generally, were severe. The disease was reported from all districts.

Infertility in Sheep.—This condition was reported from the Armidale district following grazing of a flock of ewes for more than two years on red clover. Typical lesions of cysts in the mucous membrane of the uterus of affected sheep forwarded by the Inspector confirmed the diagnosis. Although there were some reports of infertility due to grazing on subterranean clover, investigation during the year threw some doubt that the condition is as widespread as believed.

Neo-natal Losses in Sheep.—On the other hand, neo-natal losses in sheep were extremely prevalent during the lambing season throughout most parts of the State. No doubt a considerable proportion of these losses is due to exposure following lambing in inclement weather. A further portion appears to be due to a uterine inertia, resulting in suffocation of the lamb during parturition. A significant proportion is due to mortality in the lambs within a few days of birth. The actual cause of the condition is difficult to determine and investigations are proceeding. The problem appears to be worse in the southern portion of the State, including the Riverina, than elsewhere.

Johne's Disease.—Two outbreaks of Johne's Disease were detected during the year, one in the Hume district, the other in the Goulburn district. Both cattle responsible had been introduced from Victoria, though one was an animal imported from Great Britain which had been in Australia about three years.

Bovine Malignant Catarrh.—Several suspected outbreaks were investigated in the Goulburn and Orange districts, but only one case had sufficient evidence to indicate a strong likelihood that this was the cause. So far, it has not been possible to transmit the infection to healthy cattle, so the presence of the disease remains, strictly speaking, unconfirmed.

Avian Tuberculosis.—During the year, eight new outbreaks were detected, whilst ten properties were released from quarantine after application of control measures over the previous two years. Unfortunately, outbreaks were detected in the area of the District Veterinary Officer, West, and also, twice in the area of the District Veterinary Officer, Cumberland. This is the most northerly penetration of the disease for some years. One outbreak was recorded in the Cooma district, the first time the disease has appeared there.

Pregnancy Toxaemia.—The dry spell during the last few months of pregnancy resulted in an increase in the incidence of toxaemia of pregnancy. Several cases were recorded earlier during the year following the incidence of footrot in the affected flocks.

Listeriosis.—A single outbreak was recorded in the Orange district in July. In this outbreak, some thirty ewes out of 180 aborted. Foetal membranes were retained for two to three days, though no obvious metritis was seen. No cases of Circling disease were seen on the property.

Ephemeral Fever.—The outbreak recorded last year did not persist over the winter. It followed the same pattern as the previous outbreak of 1936-1937. A few isolated cases of illness in cattle on the north coast, and in the central west and north-west, were suspected to be due to this condition, but, of course, confirmation could not be obtained.

External Parasites of Sheep.—Unfortunately, the inspections at Flemington Saleyards by lay-inspectors, commenced last year, had to be discontinued following resignation of some of the inspectors. It was only towards the end of the year that it was possible to resume inspections there. There was a slight improvement in the overall position with regard to control of external parasites during the year. This is reflected in the

increased number of sheep and properties brought under control. However, the extensive use of chlorinated hydrocarbons has resulted in an increase in the incidence of mite infestation in sheep. It seems likely that the previous extensive use of arsenic kept the infestation smouldering and, with the change-over to the chlorinated hydrocarbons infestations, previously undetectable, showed up.

The following statistics are of interest, last year's figures being included for comparison:—

At Flemington				
	No. inspected		No. infested	
	Sheep	Pens	Sheep	Pens
1955-1956	1,979,229	7,186	4,558	29
1956-1957	1,278,950	4,098	5,893	119

Elsewhere in the State				
	No. of Sheep Infested		No. of Properties	
1955-1956	462,274		300	
1956-1957	754,684		540	

The operations of the field officer investigating ecte-parasites were continued during the year and he collected much valuable information, following his inspections. At present, he is concentrating on control and diagnosis of itch mite.

Internal Parasites.—Following the dry spell during late spring, summer and autumn, the internal parasite position improved remarkably. There were several reports of carry-over infestations, but the general clinical improvement in the condition of the sheep was outstanding.

Footrot and Allied Conditions.—Similar remarks apply to the incidence of footrot and other conditions affecting the hooves of sheep. There was still some evidence of infection and, on occasions, some new outbreaks occurred, even in the dry conditions prevailing. District officers attributed this to the brittle, shelly nature of the hooves and damage by the hard ground, rendering the feet susceptible to infection. Carrier sheep, of course, still remain, and will constitute a source of infection when conditions are more suitable for the spread of the disease. Foot abscess and scald disappeared almost entirely during this period.

Congenital Cerebral Deficiency in Calves.—The condition reported last year did not recur during the current year.

Tuberculosis.—Testing of cattle under the Milk Board Scheme is summarised in the following table:—

	No. Tested	No. of Reactors	Per Cent. Infection
Metropolitan	10,926	114	1.13
Blue Mountains	187	...	.....
Wollongong	1,021	21	2.06
Hunter District	1,318	...	.....
Erina	441	...	.....
Newcastle	1,295	5	0.38
Totals	15,188	140	0.92

Despite the increase in the area supplying milk to the Board, the number of herds continuing to supply raw milk remained approximately the same. This meant that the gradual withdrawal of this class of supplier, which has occurred over the last several years, continued.

A breakdown occurred in one herd during the year.

Tubercle-free Herd Scheme.—Twenty-seven stud herds, involving 3,377 cattle, were tested and two reactors were detected. Of the non-stud herds, sixty-one were tested, involving 5,954 cattle, and twenty-three reactors were detected.

Tuberculosis Protected Areas.—Tests were carried out in twelve areas, involving 2,860 cattle, and twelve reactors were detected.

Testing under the Local Government Scheme.—Testing was undertaken in sixteen areas, involving 7,817 cattle and resulted in detection of twenty-seven reactors.

Miscellaneous Testing.—During the year, in tests of cattle other than those recorded above, 89,350 cattle were tested and 5,265 reactors detected, an incidence of 5.9 per cent., as compared with 4.67 per cent. for the previous year.

Brucellosis in Cattle.—In the Department's brucellosis-free herd scheme, six herds were tested in the stud section, involving 679 cattle, and six reactors were discovered. In the non-stud section, seven herds were tested, involving 619 cattle, and one reactor was detected.

Brucellosis in Swine.—In the brucellosis-free herd scheme, twelve stud herds, involving 185 pigs, were tested, with one reactor. In the non-stud section, a further fifteen herds were tested, involving 442 pigs, and there no reactors.

Pullorum-tested Flock Scheme.—Under this scheme, the number of flocks tested was eighty-five. All the tests are undertaken by private practitioners, except in the case of Departmental flocks. There were twenty-three flocks in Class 1 (pullorum-free), involving 55,641 birds. In Class 2 (pullorum-clean), where the percentage of reactors is less than 2 per cent., there were thirty-two flocks with 95,944 birds, and in Class 3 (pullorum-tested, i.e., breeding stock only tested or more than 2 per cent. of reactors), there were thirty flocks containing 53,504 birds, making a total of 215,089.

Extension Work.—The heavy demands made by the Regional Officers on veterinary staff continued throughout the year. In addition to this demand, arrangements were made to contribute monthly extension articles dealing with veterinary problems to the "Agricultural Gazette" under the heading "Animal Health Notes". These are seasonal reminders to stockowners on the best methods of attacking their veterinary problems.

Meat Inspection Service

STATE ABATTOIR, HOMEBUSH BAY

Despite a slight fall in the number of stock slaughtered at Homebush Bay, the State Abattoir continued to handle more of each class of stock than any other abattoir in New South Wales. Almost half of the total number of sheep slaughtered in New South Wales were killed at the State Abattoir.

Inspection Staff.—The number of meat inspectors available for duty each day was invariably less than the number required for full inspection. The daily deficiency ranged up to sixteen and averaged approximately ten inspectors.

Commonwealth-State Co-operation.—The co-operation scheme was continued throughout the year.

For the first time since the inception of this scheme the Commonwealth Inspection Service has made use of the State Inspection strength which is available for assistance to the Commonwealth during short runs of export cattle in the beef unit.

Discussions on the future of this scheme were held between Commonwealth and State representatives at various times throughout the year. Consideration was given to implementing a scheme for joint inspection of all carcasses, whether for export or trade, by teams comprising both Commonwealth and State inspectors. However, no finality on this proposal has been reached.

Hygiene and Inspection Facilities.—The use of sodium citrate as an anti-coagulant for blood collected for smallgoods manufacture was introduced. Previously the blood has been defibrinated by hand-stirring. The use of sodium citrate now allows blood to be collected and stored with a minimum of contamination.

Attention was paid to general hygiene in all units and suggestions made to officers of the Metropolitan Meat Industry Board regarding improvement of hygiene. Supervision was maintained over such items as the cleanliness of floors, walls, equipment, meat handling gear, etc., and the co-operation of the Metropolitan Meat Industry Board was obtained in rectifying many major hygiene deficiencies. Difficulty was experienced in ensuring that employees working on the slaughter floors wore clean clothing of a suitable type. The most satisfactory solution to this problem would be provision by management of a clean set of clothing each day to all employees handling meat. This is done very successfully at one large abattoir in New South Wales where a clean set is issued each morning, to be returned for laundering on completion of the day's work.

Meat Market.—The new Country Meat Market was completed at the end of the year but did not come into operation until July, 1957.

The usual supervision over hygiene in regard to handling of meat and vehicles used for transporting meat from the market was maintained. Meat introduced into the market, both from Homebush Bay and outside the metropolitan abattoir area, was re-inspected by two meat inspectors who regularly maintained supervision from 10.30 p.m. to 2.30 p.m. and outside these hours when required.

Particular attention was paid to clothing worn by employees handling meat, and Pure Food Regulations regarding clothing were enforced.

Ante-mortem Inspection.—All cattle were inspected by a senior inspector on entering the counting gate leading to the lairages. At this inspection all suspect cattle marked at Flemington Saleyards or consigned direct to the abattoir were identified and recorded. In addition, 127 cattle showing some abnormality or disease, and not previously marked as suspects, were detected.

Of the 127 cattle marked at the counting gate as suspects, eighty-one were found on post-mortem to be affected with either actinomycosis or actinobacillosis, eighteen revealed simple abscesses, fifteen injuries, eight cancer, two tuberculosis, and no lesions were found in three.

Stock Inspected.—There was a slight fall in numbers of stock slaughtered and inspected at the State Abattoir:—

Year	Cattle	Calves	Pigs	Sheep
1955-1956	189,958	109,042	114,792	2,153,835
1956-1957	189,416	105,735	101,882	1,989,363

PRIVATE ABATTOIRS IN THE METROPOLITAN AREA

Again it was not possible to maintain adequate supervision over the two abattoirs and six small slaughterhouses in the metropolitan abattoir area. Supervising these premises would occupy the full time of a veterinary officer, but an officer could not be spared from other duties.

Improvements were made at the Sydney Meat Co. Abattoirs to enable beef heads to be properly inspected and correlated with carcasses.

Units for preparation of pre-wrapped meat cuts have been built at the Riverstone Meat Co. and Sydney Meat Co. Abattoirs. Preparation and wrapping of these cuts have been supervised by meat inspectors who have ensured a high standard of hygiene.

Small Slaughterhouses.—Of the six small slaughterhouses in the outer metropolitan area one licensee completed the building of new premises with facilities for holding meat in a chiller and for disposal of inedible offal and condemned parts in a steam digester.

The licence of one slaughterhouse was withheld until work to bring the premises up to required standard had been completed.

All licensed slaughtering premises in the outer metropolitan area are now of satisfactory standard as regards construction and hygiene.

Stock Inspected.—Except for the pig kill, which decreased by approximately 12 per cent., there was little change in the number of stock slaughtered during the year:

Year	Cattle	Calves	Pigs	Sheep
1955-1956	83,813	4,636	19,203	896,870
1956-1957	85,679	6,944	16,877	909,592

KNACKERY INSPECTIONS

On behalf of the Department of Public Health, slaughter of horses and spraying of carcasses with methylene blue was supervised by meat inspectors at two knackeries in the metropolitan area. These premises slaughter horses and occasional "cracker" type cattle for animal consumption only.

Details of animals slaughtered at these premises were:—

	Horses	Cattle
1955-56	9,711	7
1956-57	12,313	25

SALEYARDS INSPECTIONS

A senior meat inspector stationed at Homebush Bay inspected all cattle sold through Flemington Saleyards. Suspect and T.B. reactor cattle consigned to the saleyards on an order for movement were recorded and marked to facilitate identification at slaughter. Other cattle suspected of being diseased on inspection at Flemington were similarly marked, and proceeded direct to the State Abattoir for immediate slaughter.

In addition to 328 cattle consigned to Flemington Saleyards as suspects 781 cattle were marked by the saleyard inspector as suspected of being diseased or otherwise unfit for human consumption. On post-mortem examination 507 of these were found affected with actinomycosis or actinobacillosis, 101 revealed simple abscess formation, 59 showed injuries, 39 cancer, 12 tuberculosis, 45 various other conditions and 18 revealed no lesions.

Cattle which the inspector considered to be suffering or unfit to travel from the saleyards to the abattoir were destroyed at the saleyards by a contractor and transported to the abattoir where special inspections were made when the carcasses were dressed.

Details of cattle inspected at saleyards were:—

Year	Flemington	Private Saleyards
1955-56	231,434	6,702
1956-57	236,848	2,442

SHOP INSPECTIONS

Inspections of retail butchers' shops in the metropolitan area were made by meat inspectors after completion of regular meat inspection duties at abattoirs and slaughterhouses. The purpose of such inspections is to detect breaches of the Meat Industry Act, particularly with regard to the branding of lamb.

In only one shop was a breach of the Act detected, unbranded meat being exposed for sale as lamb.

Shop inspections during 1956-57 were 2,295, compared with 4,150 during 1955-56.

OFFENCES UNDER THE MEAT INDUSTRY ACT

Allegations regarding illegal slaughter of animals in the metropolitan abattoir area were investigated by police of the Burwood Stock Squad, accompanied by a meat inspector. No evidence of illegal slaughter was found.

A quantity of meat introduced from Queensland, comprising 16 quarters of beef, did not bear an inspection stamp and was not accompanied by a certificate of inspection. This meat was seized but no legal action was taken against the owner. One carcase of beef and one pig carcase which did not bear an inspection stamp were also seized.

Legal proceedings were instituted against a wholesale meat firm for introducing 19 carcasses of beef into the metropolitan abattoir area contrary to provisions of the Meat Industry Act. The defendants pleaded guilty and were fined.

A private employee was proceeded against under the Meat Industry Act for not wearing a clean cap covering the head while loading meat. The defendant pleaded guilty and was fined.

The proprietor of a retail butcher shop was proceeded against under the Meat Industry Act for exposing for sale as lamb part of a carcase which did not bear the prescribed lamb brand. A plea of guilty was entered and a fine imposed.

ENTRY OF MEAT INTO THE METROPOLITAN ABATTOIR AREA.

During a strike of slaughtermen at the State Abattoir from 9th to 16th April, 1957, permission was granted for several operators to kill stock at premises outside the metropolitan abattoir area and not licensed under Section 21A of the Meat Industry Act. Meat inspectors from Homebush Bay inspected the meat and supervised slaughter at these premises.

A total of 29 cattle, 134 calves and 2,779 sheep were inspected at the above premises for introduction into the metropolitan abattoir area.

INSPECTION AT COUNTRY ABATTOIRS

State meat inspectors were stationed at 13 country abattoirs and visited three bacon factories. At these premises meat was inspected for entry into the metropolitan abattoir area and for local consumption.

At 12 of the above abattoirs, Commonwealth meat inspectors were also stationed and mutual assistance was given by both State and Commonwealth Inspectors in inspection of export and trade meats.

Inspection of meat for entry into the metropolitan abattoir area was carried out by approved inspectors, employed either by the Commonwealth or local Council, at a further 10 country abattoirs and bacon factories.

Hygiene and Inspection Facilities.—Improvements carried out at country abattoirs included construction of a new beef floor and annexes at the A. W. Anderson Pty. Ltd. Abattoir, Byron Bay; completion of new beef and pork chillers and improvements to the beef floor at Wallangarra; installation at Tenterfield of facilities for complete identification of beef heads and for them to be held until inspection of the carcase is complete.

Stock Inspected.—Details of stock inspected by Departmental inspectors at country abattoirs during 1955-56 and 1956-57 were:—

Year	Cattle	Calves	Pigs	Sheep
1955-1956	292,770	347,061	307,510	531,091
1956-1957	285,182	360,881	286,946	531,615

Meat Inspections—Diseases Encountered

DISEASE CONDITIONS

A summary of conditions for which partial and total condemnations were made at abattoirs where inspection was carried out by state inspectors is:—

Total Condemnations

No. Slaughtered	Cattle 560,277		Calves 473,560		Pigs 405,605		Sheep 3,430,570	
Reason for Condemnation.	No. Cond.	%	No. Cond.	%	No. Cond.	%	No. Cond.	%
Actinomycosis (including Actinobacillosis)...	5	·0009	.....	.....	.....	.....	.....	.....
Arthritis	13	·0023	13	·0028	247	·0609	1,341	·0391
Caseous Lymphadenitis .....	.....	.....	.....	.....	.....	.....	1,079	·0314
Cysticercus Ovis .....	.....	.....	.....	.....	.....	.....	59	·0017
Emaciation	682	·1217	31	·0066	72	·0178	8,483	·2473
Sarcosporidiosis .....	.....	.....	.....	.....	.....	.....	338	·0099
Septic Conditions	413	·0737	111	·0234	2,190	·5399	709	·0207
Tuberculosis	4,310	·7693	117	·0247	1,775	·4376	.....	.....
Other Conditions	492	·0878	1,607	·3393	708	·1746	2,741	·0799
Total	5,915	1·0557	1,879	·3968	4,992	1·2308	14,750	·4300

Partial Condemnations

	Cattle		Calves		Pigs		Sheep	
	No. Cond.	%	No. Cond.	%	No. Cond.	%	No. Cond.	%
Actinomycosis (including Actinobacillosis)...	6,728	1·2008	.....	.....	.....	.....	.....	.....
Arthritis	168	·0300	9	·0019	1,595	·3933	4,336	·1264
Caseous Lymphadenitis .....	.....	.....	.....	.....	.....	.....	8,757	·2552
Cysticercus Ovis .....	.....	.....	.....	.....	.....	.....	.....	.....
Emaciation .....	.....	.....	.....	.....	.....	.....	.....	.....
Sarcosporidiosis .....	.....	.....	.....	.....	.....	.....	.....	.....
Septic Conditions	243	·0434	13	·0028	424	·1045	771	·0225
Tuberculosis	3,381	·6035	9	·0019	9,992	2·4635	.....	.....
Other Conditions	1,630	·2909	34	·0072	3,004	·7406	4,216	·1229
Total	12,150	2·1686	65	·0137	15,015	3·7019	18,080	·5270

Tuberculosis.—The overall incidence of tuberculosis in cattle and pigs varied little from the previous year. Although a slight fall from 0.52 per cent. to 0.44 per cent. occurred in the *total* condemnations of pigs there was a rise from 2.09 per cent. to 2.46 per cent in the *partial* condemnations of pigs on account of tuberculosis.

In a survey carried out at Homebush Bay the incidence of lesions of tuberculosis in 63,125 cattle (excluding T.B. reactors and suspects), was 0.53 per cent. This figure would approximate the incidence of tuberculosis in cattle from all parts of New South Wales except the north coast.

At Homebush Bay, 1,368 reactors to the tuberculin test were slaughtered. The disposition of lesions found on post-mortem examination of these reactors was head 13.2 per cent.; lungs 14.8 per cent.; intestinal tract 12.4 per cent.; two or more sites 17.5 per cent.; generalised 22.2 per cent.; carcass lymph nodes 3.5 per cent.; no visible lesions 16.4 per cent.

Of 12 bulls, reactors to the T.B. test, three revealed lesions in the scrotal lymph node only. Scrotal lymph node infection has been found relatively common in bulls affected with tuberculosis.

Beef Measles.—Only one case of cysticercus bovis infestation was detected; this was at Homebush Bay.

Liver Condemnations (Cattle).—At Homebush Bay almost 27 per cent. of all cattle livers were condemned. The approximate incidence of liver conditions in all cattle was liver fluke 19 per cent.; hydatid infestation 2.5 per cent.; telangiectasis 1.8 per cent.; abscess formation 1.9 per cent.; hepatitis of undetermined origin 1 per cent.; melanosis 0.5 per cent.

Suspect Cattle.—A total of 1,370 cattle marked as suspect (excluding T.B. reactors), were killed at Homebush Bay.

This includes 328 cattle consigned to Flemington saleyard on order for movement, 781 not on order for movement and detected by the saleyard inspector, 134 consigned direct to Homebush Bay Abattoir on order for movement, and 127 detected by the ante mortem inspector at Homebush Bay and not previously marked.

Details of the post mortem findings were:—

Disease	Flemington Saleyards		Homebush Bay	
	On Order for Movement	Without Order for Movement	On Order for Movement	Without Order for Movement
T.B.	4	12	3	2
Actinomycosis	156	237	65	40
Actinobacillosis	66	270	25	41
Cancer	67	39	16	8
Abscess	14	101	12	18
Injury	6	59	10	15
Other Conditions	12	45	...	...
N.V.L.	3	18	3	3
Total	328	781	134	127

Sparganosis.—There was a great increase in the number of feral pigs slaughtered at Homebush Bay and consequently an increase in the incidence of sparganosis. A total of 187 carcasses were condemned on account of sparganosis and 327 lightly infected carcasses were consigned to cold stores for freezing.

Liver Condemnation (Sheep).—A survey of liver condemnations from 4,500 sheep revealed that 9 per cent. were condemned; of these 28 per cent. were affected with *C. tenuicollis*, 22 per cent. with hydatids, 29 per cent. liver fluke, 15 per cent. abscess formation, 4 per cent. hepatitis, and 1 per cent. with melanosis.

Total Condemnations.—An analysis of the conditions on account of which carcasses were totally condemned at Homebush Bay is:—

Disease	Cattle	Pigs	Sheep
T.B.	242	184	...
Cancer	39	10	190
Septicaemia	129	435	492
Hydatids	6	45	...
Injury	20	4	...
Emaciation	21	20	1,582
Fevered	12	54	...
Pyæmia	4	36	...
Arthritis	1	110	813
Sparganosis	...	187	...
Jaundice	...	14	...
C.L.A.	...	...	239
C. ovis	...	...	51
Other Conditions	5	18	...
Total	479	1,117	3,367

Board of Tick Control
ERADICATION CAMPAIGN

Continuation in Kyogle Tick Quarantine Area and Tick Quarantine Areas West of the Richmond Range.—The dipping campaign, which commenced in all areas on the 9th January, 1956 (with the exception of Cullendore Area, which commenced on 6th March, 1956), continued and was completed at end-March, 1957, in the main areas, and in Cullendore Area at end-May. From 1st July, 1956, to completion of the main dipping programme, the following stock were treated:—

	Dipped	Sprayed
Cattle	3,774,964	3,191
Horses	141,951	6,280
Sheep and Goats	6,237	—

As indicated in the previous report, a number of herds which had incomplete musters during the first few rounds. were required to have additional treatments. In these cases treatments were continued until each holding had been given the required 32 fortnightly treatments. By end-June, 1957, only twenty-seven holdings were still under treatment in the areas involved.

In the previous report it was mentioned that the number of stock gradually decreased during the first few months of the dipping campaign. After 1st July, 1956, the numbers began to increase, and during the final treatment carried out in March, 1957, the following stock were treated:—

	Dipped	Sprayed
Cattle	196,850	45
Horses	6,932	317
Sheep and Goats ...	428	—

Losses associated with dipping, from drowning or injuries, were limited during the period under review. A total of eighty-six cattle and twelve horses died or were destroyed on account of accidents directly associated with dipping from 1st July, 1956, until completion of the campaign. This incidence is considered very low in view of the large number of stock under treatment.

Total cattle losses in the eradication areas over the same period amounted to 7,903.

These figures include losses from all causes, such as old age, killed by dingoes, diseases, etc.

In September, 1956, the quarantine fence between Kyogle and Casino areas was cut and a horse was illegally introduced from Casino area into Kyogle area. As a result of this action, four herds in the vicinity were involved with eighteen additional treatments.

Commencement of Inspection Period in Kyogle Tick Quarantine Area and Tick Quarantine Areas west of the Richmond Range and Detection of Two Infestations.—(a) *Lynch's Creek* and (b) *Sawpit Creek*.—On completion of the dipping, the policy laid down by the Commission of twenty-one day inspections was put into operation. By 16th June, 1957, three rounds had been completed. The number of stock examined at each round was:—

Cattle—

Round 1	.....	178.256
Round 2	.....	191.099
Round 3	.....	190.864

During the third round a single tick infestation was found in the Kyogle Area on Lynch's Creek, and during the early stages of the fourth round a further tick infestation was found on cattle on Sawpit Creek in the Kyogle area.

In both cases immediate action was taken to treat the infested herd and adjoining holdings. Special quarantine areas were declared and restrictions were placed on movement of stock from these areas. To safeguard areas west of the Richmond Range, restrictions were placed on movement of stock and "things" from the Kyogle area to areas west of the Richmond Range. Investigations have not yet revealed the reason for the presence of the two infestations, but further inquiries are being made.

Preparation of the Boonoo Boonoo Tick Quarantine Area for Eradication Campaign.—As indicated in the report for last year, tick infestations were detected in the Boonoo Boonoo Quarantine Area and preparations were commenced for the necessary eradication campaign.

An announcement was made in February, 1957, that the eradication would commence in this area on 1st June, 1957. Following this announcement immediate arrangements were made to undertake all the necessary leasing of the unmusterable country, and negotiations were made with stockowners whose country was used for sheep raising, as it was necessary to remove all sheep before commencement of the dipping campaign.

A total area of 138,155 acres on 64 holdings was leased at a cost of £80,843. In addition compensation to the value of £40,413 was to be paid to sixteen owners whose properties were used for sheep raising.

Practically all stock from the leased areas were removed before commencement of eradication but staff were still engaged in cleaning out five holdings where unmusterable cattle and horses were at large. By 1st of June, 1957, five cattle and nine horses had been destroyed.

Commencement of the Eradication Campaign in the Boonoo Boonoo Tick Quarantine Area.—The dipping campaign in this area commenced on 3rd June, 1957. During the first and second rounds, 8,932 cattle, 567 horses and six sheep and goats were treated.

During this period a further fifty-two unmusterable cattle and horses were destroyed. It was expected that the areas involved would be finally cleared of stock early in July.

DETECTION OF FURTHER ARSENIC RESISTANT TICKS

Richmond Quarantine Area.—During February, 1957, observations were made on infestations in two herds at Rock Valley. It became evident that arsenical treatments were largely ineffective and a decision was made therefor, to charge a dip (Rock Valley Dip) in this area with D.D.T. This was done in April, 1957.

Investigations were subsequently made into a herd at Ballina owned by the same owner as one of the herds at Rock Valley. It was found that ticks on this property were also arsenic-resistant. Stock had been moved from the Rock Valley holding to the Ballina holding in October, 1956, and they were probably infested at time of movement. As a result of the observations made, Ballina Dip was charged with D.D.T.

During February, 1957, cattle on a holding at Pelican Creek were infested, and in spite of several treatments the infestation persisted. Eventually it was decided to charge the dip in this area (Loyal Valley Dip) with D.D.T. for treatment of the herd involved.

During May, 1957, a herd at Jiggi was found infested and the observations again revealed arsenical treatments had no value in clearing up the infestation, and it was obviously necessary to charge a further dip with D.D.T. This was to be done early in July.

Reviewing the position at end-June, 1957, in the Richmond Quarantine Area, there were six pockets of arsenic-resistant ticks for which seven dips had been charged with D.D.T.

Tweed Tick Quarantine Area.—During December, 1956, a herd at Cobaki was found infested with ticks and in spite of the usual fortnightly treatments throughout January and February the infestation failed to clear up. It was decided to charge a dip (Cobaki Dip) with D.D.T. and this was done at end-March, 1957.

In April, 1957, a severe outbreak of tick fever occurred on a holding at Wardrop Valley. The cattle were found heavily infested at time of outbreak and treatments in arsenic had no effect. In view of heavy mortality an early decision was made to charge Wardrop Valley Dip with D.D.T. and this was done on 16th May, 1957. This holding was fairly close to a previous arsenic-resistant holding for which a dip had been charged with D.D.T. in 1954.

During May, 1957, two herds on the upper part of Piggabean Creek were found heavily infested with ticks and treatments in arsenic were ineffective. It was therefore necessary to charge a further D.D.T. dip and this action was to be taken early in July, 1957.

At end-June, 1957, there were eleven dips charged with D.D.T. in the Tweed Quarantine Area to deal with arsenic-resistant ticks. These are located at Piggabean (4), Numinbah (1), upper Crystal Creek (1), Zara (1), Terranora (2), and Condong Range (2).

TICK FEVER OUTBREAKS

Bangalow.—Towards end-December, 1956, the owner of a property about two miles south of Bangalow reported the death of a beast. Post-mortem examination revealed typical lesions indicating tick fever, and subsequent examination of smears submitted to the Veterinary Research Station revealed the presence of *Babesia argentina*. Enquiries failed to reveal the possible source of the infection. The normal control policy was adopted and no further deaths occurred.

Tregeagle.—During January an owner reported death of a beast on a holding at Tregeagle. The animal had died after dipping and the owner suspected arsenic poisoning, but post-mortem examination revealed lesions indicating tick fever, and again smears submitted to the Veterinary Research Station confirmed the presence of *Babesia argentina*.

No connection could be found between this outbreak and the previous one, and again it has not been possible to determine the possible source of the infection. No further deaths had occurred on this holding to end-June, 1957.

Rosebank.—During February an outbreak occurred on a dairy property at Rosebank. One beast died, and examination of smears collected at post-mortem confirmed the presence of *Babesia argentina*.

This holding was owned in conjunction with a property at Modanville, which was used as a dry run for both the dairy at Rosebank and the dairy at Bangalow on which tick fever was diagnosed in December, 1956, referred to above. It appears certain the infection on these two properties originated from the same source, but it has not been possible to determine its origin. Action was taken to impose the normal policy on the dairy at Rosebank and the property at Modanville. No further deaths have occurred on either holding.

Wardrop Valley.—A mortality on a property at Wardrop Valley during April, 1957 was initially investigated by a veterinary practitioner who tentatively identified tick fever. Subsequent investigations by the staff of the Board of Tick Control revealed that six animals had died over the previous six weeks—also that on an adjoining property three animals had died during the same period and there had been three

others affected. Tick fever was definitely indicated and smears confirmed the diagnosis. During the next few weeks mortalities continued on the second holding; eventually twenty-three animals died and a further twelve animals were affected. Total mortality on the first-mentioned holding was six, but six others were found (by blood inoculation tests) to have been affected.

The course of the outbreak indicated that the strain of the organism involved, *Babesia argentina*, must have been very virulent. As indicated earlier arsenic-resistant ticks were on the holding, and their presence complicated the picture, as it was necessary to charge a dip with D.D.T. before effective control was obtained. The last case of tick fever was observed fifteen days after the herd received initial treatment in D.D.T., which indicates that the D.D.T. remaining on the animals was sufficient to prevent attachment of larval ticks.

In view of the heavy tick infestation present the owners of the two affected properties were advised to dip their cattle weekly to prevent, if possible, the attachment of larval ticks. It is hoped that the owners will continue dipping at weekly intervals at least until December, 1957.

Inquiries into the possible origin of this outbreak brought considerable suspicion of an illegal introduction from Queensland.

Cobaki.—In June an outbreak of tick fever occurred on a holding at Cobaki. One animal died and the diagnosis was confirmed by the submission of smears to Glenfield.

The holding adjoins other holdings previously affected with tick fever. Pathogenic ticks may have been introduced from one or other of these.

Piggabean and Cobaki Creeks have a long history of outbreaks of tick fever, probably because of their location immediately south of the Queensland border.

ALTERATION IN POLICIES EAST AND WEST OF THE RICHMOND RANGE

As indicated in the report last year the necessity to prepare eradication areas prevented retention of sufficient staff in the Richmond and Tweed Quarantine Areas to undertake normal control policy. During the year all dips were maintained in these areas and stockowners were encouraged to undertake voluntary treatments of their dairy herds. In addition, the policy laid down that dry cattle should be dipped every twenty-eight days for the period October to May.

As a result of this change of policy considerably more cattle were dipped in these areas during the season. The average percentage of stock treated in the areas between October and June were:—Bangalow, 21 per cent.; Lismore, 28 per cent.; Casino, 40 per cent.; Tweed, 35 per cent.

Infestations in these areas became more widespread, as was to be expected, and the following figures concern infestations over the last four years:—

	1953-1954	1954-1955	1955-1956	1956-1957
Bangalow	26	44	87	113
Lismore	6	72	105	122
Casino	12	17	77	63
Tweed	274	184	97	163

With the limited staff available it was possible to inspect a number of herds but, obviously, some infestations have gone undetected. The position, therefore, is likely to deteriorate during the coming season as there will be no possibility of implementing the normal control policy in the Richmond area during 1957-58.

Treatment of properties adjoining the Kyogle and Tabulam boundaries was maintained. Stock grazing on paddocks adjoining these boundaries were treated at twenty-one-day intervals, along the same lines as stock on properties adjoining the southern Richmond quarantine boundary were treated at fourteen-day intervals.

DIP CONSTRUCTION

The Dip Maintenance Gang constructed nine new dips in the following areas: Casino (2), Boonoo Boonoo (3), Tweed (4).

In addition the Gang constructed two dips on the Queensland border at Texas and Bonshaw, required for treatment of stock moving from Queensland into New South Wales.

INVESTIGATORY ACTIVITIES OF THE ANALYST

Use of Hard Waters in D.D.T. Dips.—As indicated in the previous report, hard waters caused some difficulties with the charging of certain D.D.T. dips. Towards the end of the eradication programme, officers of I.C.I. suggested the use of a premix technique for topping up dips with hard waters, to overcome some of the difficulties in the areas in maintaining water supplies of the dips involved. The premix technique involved the use of trisodium sulphate and calgon. This method was adopted for two dips, one in Kyogle Area (Oscar Dip) and one in the Tabulam Area (Everson's Dip) with apparent success.

Careful observation were made on the general behaviour of the dips in question, also of the deposit of D.D.T. on the hair of stock treated at these dips. Stock treated at the dip in the Kyogle Area showed a gradual reduction in the amount of D.D.T. deposited over a period of several weeks, but this did not occur with stock dipped at Everson's Dip in the Tabulam Area. In view of the results obtained at Oscar Dip in the Kyogle Area, it is obvious that further work is necessary before this method can be used with certainty; opportunity is being taken to adopt this method of initially charging certain dips in the Richmond Quarantine Area, where hard waters are present. Continued observations will be made on the dips in question.

Observation on Formation of Agglomerates in D.D.T. Dips.—During observations of D.D.T. dips it has been noticed that D.D.T. crystals formed various types of agglomerates. Three types have been noted. First, the "flake" formation, a tightly-packed flat agglomeration of crystals, appearing in newly-charged baths, using soft water. The second type is a "flocculate" formation, consisting of loosely-packed assembly of crystals. This is readily suspended after stirring, becomes easily immersed in the froth and can form a heavy deposit on the topline of an animal, giving rise to excessive stripping. The third type is a "fleck" formation which results from the breaking up of a layer of D.D.T. that inevitably settles on the bottom of the bath. These "flecks" are frequently seen on the backs of animals after dipping and on the sides of the bath. Under field conditions these "flecks" do not appear to break up and probably are the cause of some inevitable waste of D.D.T.

Investigations into Consumption Rate of D.D.T. Eradication Areas.—In the previous report reference was made to the stripping of rucide dips and investigations which were undertaken, when it was found that consumption of rucide in the eradication areas was considerably greater than expected. These investigations revealed a wide variation in consumption of D.D.T. in various dips.

Although several factors probably effected the variation in consumption, such as gain in size of animals, increase in length of hair of cattle, and development of the dip from colloidal suspension of D.D.T. to a crystal formation, there appears to be also some co-relation with rainfall. During the fifteen months' dipping campaign, the peaks of consumption rate occurred after the peaks of rainfall.

Estimation of D.D.T. on Hair and Wool.—Work was continued during the year on the estimation of D.D.T. on the hair of cattle treated. The work confirmed previous observations that there is a very wide variation of the amount of D.D.T. remaining on the hair between animal and animal and from dip to dip.

Hair samples were collected from cattle at various intervals between dipping on one round and the subsequent dipping, fourteen days later. Observations from these samples indicated that considerable quantities of D.D.T. remained on the hair at least up to eight days after dipping. Even fourteen days after dipping the amount of D.D.T. found on the hair ranged from 6 milligrams to 32 milligrams per gram of hair. An effort was made to discover the reason for the wide variation in the amount of D.D.T. found on different animals dipped in the same dip and at the same time, but nothing definite was determined. It appears there is no co-relation between the deposit of D.D.T. and the grade of hair, but the number of observations made were limited and it would probably be necessary to repeat this work before being certain on this point.

Toxicology of D.D.T.—Further work was carried out in conjunction with the Director of Veterinary Research and analyses are being made of material submitted by the Director of Veterinary Research from calves fed D.D.T. at various rates. Some additional analyses were made of material submitted by veterinary officers in the Tick Quarantine Areas from animals which had shown some nervous symptoms, but it is too early to reach any definite conclusion on the relationship between the amount of D.D.T. found in the viscera of such animals and the appearance of symptoms.

Toxicology of B.H.C.—Work was completed on analyses of material submitted by the Director of Veterinary Research, from a calf which had been treated in B.H.C.

Toxicology of Arsenic.—Owing to pressure of other work it was not possible to complete investigations into toxicology of arsenic during the year.

Production of Cattle Branding Paint.—A total of 475 gallons of cattle branding paint was manufactured at the laboratory during the year. Certain changes have been made in the formula of the paint recently produced, which is much improved over previous samples, but the paint is still not entirely satisfactory. Further work is necessary to improve the persistence of the paint to make it entirely suitable for use in the Tick Quarantine Areas or for use in branding suspects.

Sensitivity of Horses to D.D.T.—As reported last year, investigations were carried out in the field on the occurrence of syndrome seen in horses in the eradication areas. Further work confirmed that the solvent was apparently responsible for the appearance of symptoms. This work also supported the suggestion that horses exposed to the solvent developed some degree of tolerance. There is also a possibility that the condition is more likely to occur in a dip freshly charged or topped up.

Analyst's Statistical Report.—

Arsenical Concentrate manufactured—5,100 gallons.

Arsenical Concentrate distributed—4,445 gallons.

Arsenical Dips analysed—7,030.

Samples of Arsenical Concentrate for manufacturing purposes—32.

D.D.T. Dips analysed—6,781.

B.H.C. Dips analysed—97.

Water samples analysed in connection with D.D.T. dips—4,795.

Cattle dipped in Arsenical Dips—1,009,114.

Cattle dipped in D.D.T. Dips—4,877,918.

Cattle dipped in B.H.C. Dips—38,100.

Paint manufactured—475 gallons.

FENCING

A total of 22½ miles of new fence, and 33½ miles of repairs, were completed; distributed over the Tabulam, Kyogle, Casino, Boonoo Boonoo, Bonalbo, Woodenbong, Lismore, Richmond and Tweed Areas.

OPERATION OF FLYING GANGS IN CLEAN COUNTRY

Flying Gangs were again sent into clean country in January, 1957, south of the Boonoo Boonoo Area and West of Cheviot. In the four months to April they examined 8,576 stock on fifty-eight holdings.

In November, 1956, two flying gangs were again established in the Grafton-Macleay Area and these worked continually to end-June. During this period they examined 25,301 stock on 556 holdings in the Grafton, Maclean, Coff's Harbour and Copmanhurst Areas. A considerable number of specimens of *Haemaphysalis* species found were submitted to the Entomological Branch for confirmation of identification.

Queensland Border Control

WESTERN SECTION

Stock Movements.—Stock movements in this Section, retarded by flood waters for part of the year, became heavy as waters receded and routes became trafficable.

From Queensland to New South Wales: cattle 38,303; stock other than cattle, 174,755.

From New South Wales to Queensland: cattle, 2,323; stock other than cattle, 50,794.

GOONDIWINDI SECTION

Stock Movements.—Large numbers of interstate stock crossings have contributed to the drought conditions which existed in the area for the last two months of the year.

Stock ex Queensland were generally in very good condition and appeared healthy but the number of P.P.C. outbreaks that occurred in cattle ex Queensland in southern districts

caused some concern. Fewer sheep were found lice infested at the border but odd mobs to and from this State were found to be infested. In most cases infestations were lighter than in previous years. Fresh outbreaks of cattle tick in Queensland, particularly the outbreak north of Charleville, are perturbing.

The following stock crossed from Queensland to New South Wales: fat cattle 27,034, store cattle 157,454, total 184,488; fat sheep 13,589, store sheep 263,396, total 276,985; fat pigs 113, store pigs 57, total 170; loose horses 874. Compared with the previous year there was a cattle decrease of 25,767, sheep increase of 108,866, pig increase of 70 and horse increase of 838.

The following stock crossed from New South Wales to Queensland: fat cattle 423, store cattle 17,090, total 17,513; fat sheep 12,889, store sheep 203,872, total 216,761; fat pigs 152, store pigs 100, total 252; loose horses 134. Compared with the previous year there was a cattle increase of 2,009, sheep increase of 64,305, pig increase of 47 and horse decrease of 144.

Dips.—Construction of a new Departmental dip was completed at Texas and a privately-owned dip at Bonshaw was taken over by the Department and charged with rucide. There was further increase in dipping fees collected. All dips and yards were maintained in good condition.

Fencing.—Many new fences were constructed in different parts of the Section and others repaired following the heavy flood at the end of the previous year.

STANTHORPE SECTION

Stock Movements.—Stock movements at Wallangarra were exceptionally heavy during some periods due to the constant draw of cattle, calves and pigs from various areas of Queensland to the two meat works in New South Wales adjacent to Wallangarra. Generally, movements operated smoothly. An outbreak of P.P.C. was detected in a mob of cattle which arrived at Wallangarra from Queensland and all precautions were taken against contact with local cattle from time of arrival to disposal.

The following stock crossed from Queensland to New South Wales: cattle 240,944; sheep 35,508; pigs 49,559; horses 849. Compared with the previous year this was a cattle increase of 23,701, sheep increase of 9,782, pig decrease of 5,834 and horse increase of 477.

The following stock crossed from New South Wales to Queensland: cattle 2,272; sheep 94,370; pigs 27; horses 722. Compared with the previous year this was a cattle decrease of 261, sheep increase of 46,765, pig increase of 17 and horse increase of 254.

Dips.—Considerable repairs were carried out to Wallangarra and Stanthorpe dip yards, which are subject to heavy traffic. Stanthorpe dip was taken over by the Board of Tick Control on 1st June, 1957 in connection with the Eradication Campaign in the Boonoo Boonoo Tick Quarantine Area.

Fencing.—Forty-eight miles of buffer line contiguous to the Boonoo Boonoo Quarantine Area was surveyed to site the fence on the correct water shed. The result of the survey is awaited. As it was necessary to commence eradication measures in the Boonoo Boonoo Area at 1st June, 1957, a temporary line consisting of orchard boundaries was adopted between Cottonvale and Thulimbah over a previously unfenced portion of a distance of three miles. Existing fences were maintained by patrol officers and in one part stock-owners assisted the staff in keeping the fence, consisting of dog-proof and rabbit netting on the northern boundary of New South Wales sheep properties, in good order.

Registered Paddocks.—Very heavy damage occurred to river boundaries during the previous year by continual flooding. These have now been restored and the position is generally satisfactory.

Glenfield Veterinary Research Station

GENERAL

The area of the Station remains unchanged at 600 acres subdivided into 43 paddocks.

Seventy acres were under cultivation during the year. The wet autumn restricted the preparation for sowing. Sixty acres sown to oats yielded one ton of hay to the acre. Two acres were sown to wheat and eight acres to miscellaneous crops for provision of green fodder for laboratory animals. Production of cereal hay was poor and was directly due to the failure of effective rain over the growing period.

Mr. P. B. Setchell, B.V.Sc., continued his studies at the University of Cambridge.

Mr. R. Layland, Laboratory Assistant, was in British North Borneo on assignment under the Colombo Plan.

Mr. E. J. McBarron, Special Research Officer in the Nutrition Laboratory attended the Seventh World's Grasslands Conference held at Palmerston North, New Zealand in November, the visit being made possible by a grant from the Pastures Protection Boards Council of Advice.

Field Days.—Three field days held were for: delegates of the West Darling Pastures Protection Boards (first occasion on which their Annual Conference has been held in Sydney for over 20 years); Members of Veterinary Inspector's Institute; and delegates to the Annual Convention of the Pastures Protection Boards.

The Director of Veterinary Research and other members of the professional staff gave addresses at primary producer conferences and field days in various parts of the State. The Director also gave addresses at the Animal Husbandry School at Inverell, the Turkey School at Wagga and opened the Annual Convention of the Breeders and Hatcherymen's Association at Pennant Hills.

Visitors.—Many overseas visitors came to the Station for discussion on topics on a wide variety of scientific interests.

Colombo Plan and F.A.O. Fellows.—Holders of Fellowships under the Food and Agriculture Organisation of the United Nations and Colombo Plan were provided with facilities and instruction from the professional staff during various periods of the year.

VETERINARY DIAGNOSTIC SERVICES

The volume of diagnostic material received was the highest in the history of the Station. Total entries in the Specimen Register were 4,910, an increase of 740 over the previous year. The number of individual specimens exceeded that for any previous financial year, the total being 43,763—19,529 in excess of the year 1955-56. This remarkably high total was attributable to the widespread epizootic of contagious pleuro pneumonia of cattle which occurred in a number of districts of the State and the very substantial volume of sera received for submission to the complement fixation test for the detection of animals carrying the infection.

It has been possible to meet this requirement only by deferment of research, which has meant diminished activity on several projects. At the beginning of February 1957, the duties of the former inspectors of stock, now veterinary inspectors, were changed to relieve them of any function under the Pastures Protection Act, and their time was devoted solely to disease control and investigation. This immediately increased the volume of diagnostic material received at the Station and as compared with the same period of 1956 represents a 16 per cent. increase.

Points of interest revealed by the tabular matter on diagnostic material are the very substantial increase in contagious pleuro pneumonia. Leptospirosis also shows a very significant lift. Acetonaemia was down, probably resulting from dry conditions. In sheep, intestinal parasitism was up with a marked increase in material for foot rot diagnosis. Ovine brucellosis showed a sharp decline. Anthrax was down also, but mineral imbalance showed a marked increase.

There was some slight increase in specimens from pigs but the overall total for poultry was down on the previous year. Of the specific conditions, navel infection of chicks showed a marked decline, but there was well over 100 per cent. increase in incidence of avian monocytosis, which threatens to become one of the major disease problems of the poultry industry. Whilst the pathogenesis is still obscure a satisfactory treatment response is obtained from the administration of terramycin and molasses in the drinking water.

Specimens Examined	1954-1955	1955-1956	1956-1957
Cattle	10,410	16,083	36,503
Sheep	695	867	998
Horses	85	37	58
Pigs	1,448	1,279	1,334
Poultry	3,444	5,161	4,336
Miscellaneous Animals and Birds	225	227	236
Miscellaneous other specimens,	732	580	298
	17,039	24,234	43,763

Specimens Examined	1954-1955	1955-1956	1956-1957
Entries in Specimen Register ...	4,013	4,170	4,810
Inspections under the Provisions of the Noxious Microbes Act.	17	15	20

Publications.—There was a substantial decline in the number of scientific papers published during the year. It could not be expected that the volume of papers published during the previous two years (70) would be maintained. This year 10 papers have been published, all in Australian scientific publications.

VETERINARY RESEARCH—CATTLE

Artificial Stock Breeding Station, Berry.—Mr. B. Doyle, B.V.Sc. was appointed by the Milk Board of New South Wales as Director of Artificial Insemination. In accordance with the agreement reached between the Milk Board and the Department that the administration, trading and development of the Station will be the responsibilities of the Milk Board, whereas technical advice and research on artificial insemination will remain a function of Glenfield Veterinary Research Station, such advice and assistance was given from time to time and the basic training of two groups of lay inseminators on the fundamentals of artificial insemination prior to their appointment either to the Berry Centre or one of the sub-centres was undertaken. In addition accommodation was provided for Berry bulls during "rest periods".

Artificial Insemination of Dairy Cattle.—Investigations were continued into the possible value of liquid paraffin as an ampoule seal under conditions of low-temperature storage of semen. As a result of a series of experiments it was found that when ampoules are in contact with alcohol during storage, a layer of liquid paraffin added to open ampoules of diluted semen prior to freezing gives less reliable and often inferior results when compared with heat-sealed ampoules. In the absence of alcohol in the storage mixture, paraffin sealing was satisfactory, but showed no advantage of breakage, which is fairly common in heat-sealed ampoules subjected to low-temperature storage, due to contraction of the glass heat-fused seal.

Investigations on low-temperature storage of semen have proceeded. A metal cabinet was designed which carried a one-inch layer of paraffin in the wall cavities with an onazote lid and marginal flange extending into the paraffin. The storage space in the inner compartment is greater than in the much larger wooden cabinets which incorporate a six-inch layer of onazote insulation in the walls and hinged lid. The indications are that this is a better container for holding vacuum jars of ampoules and dry ice. In the paraffin box, sublimation occurs more slowly until appreciable frosting occurs in the external metal walls. Further investigations are required on this point.

Bovine Infertility Techniques.—In the general problem of bovine infertility, which contributes very significantly to success or failure of a dairy herd, venereal infections constitute a substantial fraction of the numerous components which embrace this overall problem. In the diagnosis of vibriosis and trichomoniasis considerable difficulty is encountered in the laboratory in demonstrating the presence of these organisms owing to the presence of contaminants in vaginal exudate received from the field.

From a series of experiments designed to investigate improved methods of collection from the female it has been found that by means of a plastic insemination pipette connected to a 10 ml. syringe by four inches of flexible rubber tubing, satisfactory material can be obtained. Following dilation of the labia the pipette is introduced, care being taken to avoid the posterior vaginal walls, then through the cervix into the uterus if required. The plunger of the syringe is withdrawn and so creates a negative pressure, and by a back and forth movement of the pipette sufficient mucus is obtained. Then by pressure adjustment of the syringe the pipette with its contents is withdrawn and the contents expelled into a small sterile bottle. In herd examinations fresh equipment must be used for each animal and the hand of the operator washed and scrubbed between individual animal examinations.

Bovine Trichomoniasis.—The investigations each year emphasise that this infection is widespread amongst the dairy herds of the State and its control presents an ever-increasing problem, solution of which seems to be in providing a more extensive coverage by artificial insemination. The occurrence of the disease in a valuable imported dairy bull which became

infected after several years' service in N.S.W. has stressed the risks associated with the wide use of a bull or cows whose breeding history and genital health are suspect. Sires being used at A.I. centres must be subjected to heifer test matings, then kept in complete isolation with security whilst being used as donors.

The effect of low temperature storage, glycerol and antibiotics on *T. foetus* in semen and cultures has been further studied. The organism survived in cultures containing up to 4 per cent. glycerol. Where semen has not been equilibrated after collection, but subjected to low temperature storage, viable *T. foetus* was recovered when up to 15 per cent. glycerol had been added prior to storage. The equilibration of semen seems to be essential for successful destruction of *T. foetus* in semen by glycerol. The addition of antibiotics to the semen assists the survival of *T. foetus* by eliminating bacterial contaminants from the medium. This is in contradistinction to *V. foetus* which is destroyed by antibiotics.

Vibrio Foetus.—This venereal infection of cattle is showing an increasing incidence and warrants intensive investigation. Progress in the elucidation of knowledge of the problem has been hindered by the difficulty experienced in maintaining the organism in a viable condition away from the host. Research workers throughout the world have not yet elaborated a medium in which the organism can be maintained in a viable condition for reasonable periods. A number of media have been tried during the last twelve months with little success, and this has proved an inhibiting factor in the progress of the investigation. Unlike *T. foetus* infection, *vibrio foetus* does not confer a marked immunity and cows can readily become reinfected.

Infectious Papillomatosis.—An infectious form of warts or papillomatosis is encountered at times in cattle and goats. In the case of the latter animal it is not known whether caprine strain of the condition is identical with the bovine, in which it gives rise to multiple growths over almost the entire surface of the head and body. In goats the lesions are usually restricted to the udder and seriously impede milking. A prophylactic vaccine has been elaborated here, prepared from a bacteria-free filtrate of wart material, and a field test is in progress on stock at Bathurst Experiment Farm. Tested under laboratory conditions the vaccine showed promise as a prophylactic.

Enterotoxaemia of Cattle.—The occurrence of enterotoxaemia due to *Cl. perfringens* type D is rare in cattle, but a case was confirmed in a three-months-old calf from which a potent bowel toxin was confirmed as the toxin of *Cl. perfringens* type D.

Bovine Malignant Catarrh.—The peculiar exacerbation of this disease which occurred some three years ago has now shown a sharp decline. It is gratifying to report that only one confirmed case was encountered during the year.

Hypocuprosis in Cattle.—Further experiment work was undertaken in studying the effect on the copper status by the interaction of molybdenum sulphate and manganese. Steers were used as the subjects of the experiment, the basal diet of which contained 7.6 parts per million of copper, 2.4 p.p.m. of molybdenum, 91 p.p.m. of manganese and 0.03 per cent. of sulphate. This resulted in an increase in the liver copper level of 168 p.p.m. In steers on a similar intake, except that sulphate was increased to 0.55 per cent., the liver copper value decreased significantly to 64 p.p.m. irrespective of intakes of 91 p.p.m. and 391 p.p.m. of manganese. An increase in molybdenum to 9.2 p.p.m. resulted in a decrease in liver copper to 5 p.p.m. for animals on 0.55 per cent. sulphate, but was without effect on animals on 0.03 per cent. sulphate intake.

There was no clinical syndrome or effect upon appetite or growth on the high molybdenum high sulphate intake despite the development of low liver (2.6 p.p.m.) and low blood (0.02–0.05 mgm/100 ml) levels which were maintained for 15 weeks. The experiment indicated that the copper status of cattle is affected by the interaction of molybdenum and sulphate but not by manganese.

Examination of biological specimens, blood, liver, and pasture received from field officers has confirmed earlier findings that copper deficiency occurs in cattle under field conditions, but only in restricted areas of the State.

Nasal Granuloma.—A few animals affected with this condition were located in a dairy herd a few miles from Glenfield, and opportunity was taken to carry out experimental treatment with lithium antimony thiomalate. This preparation is apparently used successfully in India to treat tropical nasal granuloma in cattle, stated to be caused by a schistosoma. It has also been used by a number of veterinarians in this State, with mixed results.

Two animals which had been affected with nasal granuloma for at least 12 months, were each given two injections of 20 cc. at weekly intervals, but no improvement was apparent over the following three months. A third animal which had only been visibly affected about two months, showed no improvement from a single injection, but showed marked sensitivity to the drug, the single subcutaneous injection resulting in an extensive oedematous swelling and lameness for five days.

The District Veterinary Officer at Grafton also reported no improvement in a case given four injections of 20 cc. at weekly intervals, and, a short time later, four more treatments at fortnightly intervals.

Milk Fever Complex.—The experiment at Yanco Experiment Farm, using a phosphatic supplement in an endeavour to control milk fever, continued. Of 18 cows calving, 10 were treated with supplement and eight were untreated. One case of milk fever occurred in the treated group, none in the untreated. To date the Guernsey herd at Yanco has not shown the high incidence of milk fever seen in the Jersey herd. Studies on the parathyroid glands, from aged and chronic milk fever cases, have indicated fibrotic changes and numbers of oxyphil cells. Nineteen outbreaks of suspected milk fever were investigated biochemically, 11 of which were confirmed. Of the remaining eight, three were cases of hypomagnesaemia.

Acetonaemia in Cattle.—Elaboration of a satisfactory and reliable method for testing urine in suspected cases of acetonaemia has been undertaken. This project aimed to examine the relative merits of Rothera's, Boddie's and Acetest reactions on urine. Boddie's test and Acetest tablets gave identical results and served to separate cases of primary and secondary acetonaemia.

Hypomagnesaemia.—As a result of prevailing dry conditions throughout spring and summer, there was a low incidence of hypomagnesaemia. Trials are planned to investigate this condition in the Bowral-Kangaloon area during the coming year.

Leptospirosis in Cattle.—The serological survey continued during the year, some 581 bovine sera from 145 properties being examined. A large percentage of these sera were submitted for diagnosis and as a result tentative diagnosis of leptospiral abortion was made in 15 separate herds. Suitable specimens for confirming this diagnosis were received only from one herd; in this case the diagnosis was confirmed by demonstrating the organisms in foetal tissue. On three of these properties where abortions occurred, calf losses due to leptospirosis were also reported. On two other properties leptospirosis in calves occurred without evidence of abortions.

These outbreaks of bovine leptospirosis occurred on the north coast, northern tablelands, north-west slopes, Illawarra, south-west slopes and Riverina, revealing a widespread distribution throughout the State.

Serological evidence on a number of aborting cattle on one property in the Hay district suggests *L. hyos* as the type of organism responsible, but in all other outbreaks, *L. pomona* was involved.

VETERINARY RESEARCH—SHEEP

Toxaemic Jaundice.—The paper prepared by the Joint Toxaemic Jaundice Investigation Committee was published during the year and a final report of the Committee, summarising their work and findings, has been published.

Incidence of both heliotrope poisoning and chronic copper poisoning in the enzootic areas was particularly low. This could be attributed to the low rainfall, especially during summer; rain is essential to the germination and establishment of the plant *Heliotropium europaeum*. This plant was conspicuous by its absence last summer.

Listeriosis.—During 1955, this condition was showing a trend towards increased incidence. During the year, however, only one outbreak came under notice and was confirmed as listeriosis. The condition occurred as an outbreak of abortion amongst pregnant ewes. At times this is followed by the circling disease manifestation of the condition during the following year.

Ovine Brucellosis.—A number of rams, especially of British breeds of sheep, have been investigated as possible cases of ovine brucellosis, but evidence is accumulating that this infection is not widespread in the sheep flocks of this State.

The ram populations of some of the prominent Merino studs have been surveyed both by serological and bacteriological means. Some cases of abnormality of the epididymitis have been detected on clinical examination, but the lesions have arisen from causes other than *Br. ovis* infection. The rams have been negative serologically and bacteriologically to this infection. It is becoming increasingly evident that the

rejection of a ram as being infected with *Br. ovis* solely on clinical examination is fundamentally unsound as many rams have been seen with abnormalities of the epididymus which are not infected with *Br. ovis*.

L. Thyroxine and Wool Growth.—Further studies have been made on the effect of L. Thyroxine on sheep. These involved observations on the rate of absorption of L. Thyroxine sodium implants in the subcutaneous tissues. In 18 sheep, implants were inserted in the fascia between thigh muscles, then removed surgically at varying periods after implantation up to two months, and analysed for residual L. Thyroxine. The results failed to show a uniform rate of absorption in the sheep used.

Experiments aimed to study the effect of L. Thyroxine on reproduction in the female have been commenced, using the female mouse.

Copper Deficiency in Sheep.—Additional material from a number of the sheep-raising districts of the State has been examined analytically. This covers analyses of blood, liver, pasture and wool. The results indicate that copper deficiency in sheep in N.S.W. is restricted to a particular region of the Coonabarabran Pastures Protection District.

Urinary Calculi in Sheep.—In some wool-growing districts, particularly the West Darling country, urinary calculi in wethers is an ever-recurring problem. The calculi consist predominantly of calcium and magnesium salts. During the year experiments commenced in which attempts are being made to lower the reaction of urine to prevent the deposition of alkaline salts. The experimental sheep are housed in metabolism cages from which the twenty-four hours' output of urine can be collected and examined for pH and specific gravity. Ammonium chloride is administered by mouth at the rate of 15 grms. per day. At this level urine pH was lowered, but the absolute level attained was dependent on the ration fed. A high proportion of grains lowered the pH, whereas lucerne, which exercises a diuretic effect in sheep, raises the pH. Studies, both in vitro and in vivo, using ewes have shown that "acidified" urine does not affect the dimensions or composition of calculi.

Dwarfism in Sheep.—The first probable occurrence of so-called "dwarfism" in sheep ever encountered was brought to notice during the year. The condition has been recognised in cattle, especially some of the beef breeds during the last decade, and much is already known of the genetic mechanisms associated with its occurrence. A ram and a ewe showing the phenotypical characters of dwarfism have been procured for further study. The somatic features of the animals have been measured and recorded by photographs and various matings undertaken with normal sheep. A close study of the breeding lines of the flock in which the condition occurred has been made, and indications are that the gene was introduced by a purchased ram. More definite information on the genetic origin will be acquired when further generations from the present matings are available.

Foot Rot in Sheep.—Railway sheep vans have frequently been blamed for harbouring the footrot organism and acting as a source of infection to healthy sheep. One trial was conducted in which a number of sheep, each with active lesions of footrot in three feet, were housed in a sheep van with non-infected sheep for forty-four days, but there was no spread of infection to the health sheep.

VETERINARY RESEARCH—POULTRY

Pullorum Disease.—The experiment current for some two years, in determining the efficacy of Furazolidone against *S. pullorum* infection, has been continued using the progeny from "carrier" hens. This has involved to use of forty-eight progeny pullets which have given a positive agglutination to the tube test. Half have been treated with 0.04 per cent. Furazolidone, the others untreated as controls. The treated birds have not shown a fall in their agglutination titre up to five months after treatment ceased, but egg production in the treated group has been approximately 35 per cent. higher than in the untreated controls.

Avian Monocytosis.—This disease is developing into one of the major problems of the poultry industry in this State. This is shown by the following figures:—

Between 1943 and 1954 only 19 outbreaks were encountered, all in pullets in the laying stage.

In 1955 there were 52 outbreaks in fowls and 3 in turkeys. Only 16 of the 52 outbreaks were in birds over 10 weeks old.

In 1956 there were 170 outbreaks in fowls, 60 per cent. of which were in birds under 10 weeks old.

In 1957 to the end of the financial year, the incidence has shown a further increase, and is particularly prevalent in young stock under 10 weeks old, even chickens 7 days old being involved.

The peak incidence of the disease occurs during July, August and September. One outbreak confirmed in ducks is the first reported occurrence of the disease in these birds in the world. Whilst much remains to be done on determination of the etiology of this disease and its pathogenesis, treatment is effective by starvation and reducing the protein content of mash by 50 per cent. for seven days, and administration of molasses in drinking water at the rate of 5 oz. per gallon for seven days. The antibiotic, Terramycin, administered in the mash at the rate of 20 lb. per ton for three to five days has also given very good results in controlling the disease.

Respiratory Diseases.—Good progress has been made in control of the respiratory disease complex in poultry. Mucoid tracheitis, the etiology of which is associated with pleuropneumonia-like organisms, responds well to treatment with Streptomycin or Streptopen intramuscularly in the early stages, with recovery in twenty-four to seventy-two hours. Chronic cases which have existed for over three weeks can be successfully treated with subcutaneous injections of Terramycin in oil. These cases do not respond to Streptomycin which is also ineffective against infectious laryngo tracheitis.

Nutrition Research from Glenfield Laboratory

Calf Rearing.—The experimental investigation into the use of dried milk products in meals for early weaned calves has continued. These experiments have shown that calves should be well started on whole milk before weaning, usually at two weeks old, and that general management of the calves must be satisfactory.

Nutritive Value of Rice Straw.—This investigation arose as a result of the possibility of rice straw being toxic for cattle when used as bedding, due to high oxalate content. The oxalate content was found to range from 0.29 per cent. to 0.35 per cent. according to whether the extraction was acid or alkaline. These values were considerably lower than those reported by Indian workers. The crude protein was 2.2 per cent. Feeding trials with sheep indicated a low digestibility of the fibre.

Drought Feeding Research in Sheep.—During the year another series of projects were fulfilled in the Burdekin Unit in co-operation with officers of C.S.I.R.O. Division of Animal Health and Production. The main experiment has been an investigation of the utilisation of low-quality roughage by two-tooth Merino ewes and wethers. The roughage which has been available *ad lib* contained 2.5 per cent. crude protein. The supplements fed were linseed meal, peanut meal, coconut meal, cotton seed meal, meat meal, lucerne chaff and linseed meal or lucerne chaff plus wheat plus a urea-sulphate mixture fed twice weekly at levels which provide nitrogen intakes equivalent to that provided by 3 oz. linseed meal. Wheat and oat grains are also being fed alone or with two different levels of urea-sulphate mixture. Two control groups received the chaffed straw only.

Performance as measured by body weight, survival rates and roughage consumption was satisfactory in groups fed linseed meal, coconut meal, cotton seed meal, lucerne chaff and linseed meal or lucerne chaff plus wheat plus urea-sulphate. Performance was less satisfactory in the group fed peanut meal, and losses were heavy in meat meal where a number of sheep refused to eat the supplement.

Where wheat and oat grain comprise the supplement, performance has not been good, particularly where only 3 oz. of wheat is fed. In groups where urea-sulphate mixture has been added to wheat or oats, body weight and roughage consumption have improved and survival rates generally have been better than with grains alone. In the two control groups losses have been heavy and body weights of survivors have fallen 26 per cent. of the initial mean weight. The experiment is still in progress.

Copper Sulphate as a Stimulant to Pig Growth.—Two experiments were undertaken to determine the value of copper sulphate as a stimulant to pig growth.

In the first experiment under field conditions no beneficial effects were obtained from inclusion of 250 p.p.m. of copper in the diet. In the second experiment under individual feeding conditions, viral pneumonia occurred and marred any definite conclusions being drawn. It was found, however, that the inclusion of 0.1 per cent. copper sulphate did not affect the palatability of meal but a level of 0.5 per cent. reduced palatability and hence feed consumption very considerably.

Miscellaneous Projects

Myxomatosis.—Studies on the epizootiology of myxomatosis were continued through the year. Over the State generally the rabbit population has remained at a low level. There are isolated areas where numbers have increased, but considerable areas of the State can be traversed without a rabbit being seen.

Points worth mention are:—

1. The tonnage of rabbit skins offered for sale in Sydney constitutes the lowest since rabbit skin auctions commenced, namely 279 tons as against 376 the previous year, a reduction of 21 per cent., or, more significantly, 90 per cent. reduction on the mean of the decade prior to the release of myxomatosis.
2. There is evidence that rabbits are surviving an attack of the disease and as a result are completely resistant. Some rabbits received from the Hay district, when challenged with highly virulent virus at the laboratory, failed to develop the disease.
3. The summer of 1956-57 was the first since the disease was released that above-average rain has not fallen. The summer period was relatively mild, there was an almost total absence of surface water suitable as breeding areas for mosquitoes, the main vector of the disease. In addition the greatest plague of dragonflies ever known prevailed during spring and early summer months and mosquito larvae constitute the main item in the diet of the dragonfly. All early hatchings of mosquito eggs were consumed and this had a considerable influence on the intensity of mosquito populations throughout summer. At Dubbo in the central-west, mosquitoes of all genera were absent throughout summer. This absence of vectors accounted for the failure of the disease to operate as an epizootic in a sparse rabbit population throughout summer.
4. The standard laboratory strain of virus has been maintained at a high virulence and distributions were continued from the laboratory on request. This year it was possible to reduce the number of doses of virus in an ampoule, without losing virulence, to twenty-five. The number of requests for virus received amounted to 742, a 10 per cent. increase over any previous year. This involved distribution of 7,763 ampoules, which exceeded the highest of any previous year by 2,000 ampoules, the total number of rabbit doses being 200,200.

The substantial increase in the number of requests for virus indicates a general overall increase in rabbit numbers, but climatic factors and predator effects which operated over the summer of 1956-57 were most unfavourable for establishing the disease as an epizootic. During the year a number of districts of the State have encountered drought to near-drought conditions, yet livestock losses from inanition have been negligible, owing to the absence of grazing competition with a high rabbit population.

Paratyphoid in Canaries.—Two severe outbreaks of *S. typhimurium* infection in canaries occurred in commercial aviaries. Furazolidone proved very effective in controlling the mortality, but no response was obtained with aureomycin. Furazolidone was administered in the form of a pellet to the individual birds.

Silage Investigations.—Collateral experiments are being undertaken at Veterinary Research Station and Wollongbar Experiment Farm. At the Veterinary Research Station the processing of silage with certain additives is being studied in glass containers holding 3 to 4 lb. of ensiled material. At Wollongbar similar observations are being made in a series of small silos of 3 tons capacity. At Wollongbar the plant material was kikuyu grass. The additives used were salt, molasses, sodium metabisulphite and grain. Low lactic acid figures were obtained, but volatile organic acids, especially butyric were high. The project is still current.

Toxicology

Toxicity of D.D.T. for Calves.—Another experiment was undertaken to obtain further information on the toxicity of this chlorinated hydrocarbon for young bovines.

Five calves aged from five days to seven weeks old were given D.D.T. at rates from twenty to fifty mgms. per kilogram per day. The calf on the highest rate developed symptoms in eight days and died seventeen days after commencement of feeding. The calf receiving forty mgms. per kilogram per day showed symptoms after three and a half weeks and died after seven and a half weeks. Two calves receiving thirty

to forty mgms. per day showed no ill effects over six weeks, yet a calf receiving the lowest level of twenty mgms. per day developed symptoms in five days and died in seven days.

These findings suggest that whilst most calves can tolerate a daily intake of twenty to thirty mgms. of D.D.T., individual animals possess an idiosyncrasy to the compound.

Stock Poisonings by Inorganic Compounds.—Over the years stock, especially cattle and sheep, have been lost from poisoning resulting from access to materials containing salts of the heavy metals. Many of these mortalities can be attributed to arsenicals, but in recent years there has been a substantial increase in the number of cases confirmed as lead poisoning, due, in some cases, to carelessness on the part of owners and their failure to appreciate the danger to stock of lead-based paints. Plumbism or lead poisoning in cattle presents a characteristic syndrome which frequently is unrecognised by clinicians but can be confirmed by quantitative analysis for lead of the ingesta and abdominal viscera.

Arsenic. During the year twenty-six mortalities in stock were confirmed due to arsenical poisoning. These were associated with the deaths of sixty cattle, 401 sheep and two horses. In some cases the source of the poison was determined, namely:—

Sprayed grass	4 cases
Rubbish dumps	3 cases
Arsenate of Lead	1 case
Post dipping mortalities	4 cases
Post drenching mortalities	3 cases

Lead. Nineteen mortalities in stock were confirmed on analysis as lead poisoning. The number of animals which died were forty-two cattle and one dog.

The sources of the lead were paint and paint flakes in six cases, and red lead in two. In all, 120 analyses for lead were carried out.

Toxic Plants.—Three suspected toxic plants were critically examined for poisonous properties. These were *Phyllanthus lacunarius*, *Hannafordia bissillii* and *Solanum sturtianum*. *P. lacunarius* or Lagoon Sponge was fed to sheep. It proved distasteful, and whilst producing inappetence did not give rise to other clinical conditions. Also under field trials conditions the plant was distasteful to sheep. Extracts of the plant prepared in various ways were without harmful effect.

The foliage and fruits of *Hannafordia bissillii* were fed to sheep over a period of twenty-eight days, but less than half the daily ration was eaten. After fourteen days there was complete inappetence and impaction followed. It is considered that the plant does not possess toxic properties.

Solanum sturtianum has been known for years as a toxic plant, but following losses in sheep at Broken Hill in recent months, experiments were undertaken in an effort to clarify the toxic components of the plants and to determine the approximate level of toxicity. It was found that the toxic factor is in the berries and is water-soluble. The watery extract from eight oz. of berries administered to a sheep of 100 lb. liveweight resulted in death from acute enteritis in approximately fifty hours. Smaller quantities of the berries were usually not fatal, but one sheep given watery extract from two oz. of berries, whilst not showing ill health following drenching, developed a break in the fleece after a few weeks.

Shannon Vale Nutrition Station

The climatic conditions throughout the year were the most satisfactory for many years. Rainfall was a little below the mean, but warm sunny weather, especially during the colder months, proved ideal for sheep health. Young sheep grew well and mature sheep maintained excellent condition. A Field Day held on 27th September in excellent weather was attended by sixty people.

The new shearing shed was erected and used for the 1956 shearing. The clip amounted to thirty-six bales. The shed, a long overdue improvement, enables 550 sheep to be housed during inclement weather.

One of the sown pasture paddocks put down in 1944 was ploughed, sown to Japanese millet, heavily grazed during summer, then resown in early March to rye grass and white clover.

The general trend of the experiment work at Shannon Vale is towards pasture utilisation and animal interaction. It is noted that certain procedures in this field, elaborated at Shannon Vale, are now being widely applied by New England

graziers. Paddocks are being prepared for definite seasonal sheep functions and a programme developed of feeding sheep at selected differential nutritional levels.

Effects on the two flocks of Merino ewes grazed on sown pastures at seven and three and a half days respectively are still being studied. Results have shown that the seven days sown pasture grazing applied to young sheep from "in utero" to the suckling of their first lamb at two years of age, produces a very appreciable difference in lambing percentage, as contrasted with the three and a half days flock.

As adults the most significant difference between the two treatments occurs in wool production, the seven day flock yielding one lb. per head more wool.

The observations have continued on flocks grazing pasture areas in which grass species are segregated into specific areas, in contrast to mixed species areas. No important differences have been found to date and it is still early to assess changes in pasture production.

The paddocks topdressed with either one, two or three hundredweight of superphosphate per acre per year have shown very considerable increase in carrying capacity in favour of three hundredweight application. In the spring of 1956 the three hundredweight paddocks were carrying five sheep per acre per annum, and the one hundredweight paddocks 1.4 sheep per acre per annum.

In the fat lamb programme, Romney and Merino ewes have been mated to Cheviot rams. A poor lambing percentage was obtained, and this programme is to be repeated in 1957. This was most unexpected, as the flocks on the Station gave between ninety per cent. to ninety-six per cent. lambs. Ewe lambs of Cheviot x Romney and Cheviot x Merino have been retained for mating between nine to ten months and nine male lambs of Cheviot x Romney have been retained as entires.

Wool Research Laboratory—Trangie Agricultural Experiment Station

Mr. R. B. Dun, B.V.Sc., who has been acting Officer-in-Charge since the departure of Dr. Morley, has however been located in the Department of Genetics, University of Sydney, where he is taking a post-graduate course in genetics under Dr. J. M. Rendel. During the year Mr. A. J. Marrant, B.Sc., has acted as Officer-in-Charge.

At the close of the last financial year the Trangie Station was flooded, and a high incidence of infectious foot rot occurred amongst the sheep in all paddocks on the Station. This involved treatment of affected sheep throughout the whole year—and with favourable climatic factors from July, 1956, the disease had been brought completely under control by June, 1957.

The last six months of 1956 provided a striking contrast in climate to the first half of the year. For the whole twelve months' period only thirteen inches of rain were recorded, fifty per cent. of which fell before November, 1956. Winter annuals, notably medicago and hordeum made good growth during late winter and spring, but the failure of spring, summer and autumn rain led to a scarcity of grazing during summer which became severe in autumn, owing to the total absence of soil moisture to germinate winter annuals.

Breeding Experiments.—The ewes (450) mated by artificial insemination in autumn 1956, under very adverse conditions produced only 35.2 per cent. of lambs, of which thirty-four per cent. were marked and 32.9 per cent. weaned.

The spring mating was affected significantly by the presence of foot rot in the ewes, of which 800 were paddock-mated and 500 by artificial insemination. Foxes were responsible for heavy losses in young lambs. The lambing percentage was seventy-nine per cent. of which 72.7 per cent. were mothered, sixty-eight per cent. marked and 65.9 per cent. weaned. The selection demonstration flock has been maintained and continues to be culled heavily for bodywrinkles, heavy face cover and low numbers of crimps per inch. The registered stud flock No. 78 continues as a comparison with the S.D. flock. Visual appraisal only is employed in selection in this flock.

Further data has been recorded from the ten selection groups. Each consists of 100 ewes mated to five rams annually and are entirely inbred. Single character selection is practised for and against clean fleece weight, crimps per inch, weaning weight and skin folds. The objects are to ascertain the heritability of selected and correlated characters. Clear differences are evident again between the groups and the characters selected. In selecting for and against clean fleece weight a between-groups difference is produced in crimps per inch.

The experimental study on the association of poll gene with fleece characters has continued. Fleece analysis this year supports the previous year's data, namely that heterozygous polled ewes are nearly 0.5 lb. lower in clean fleece weight than the homozygous horned half sibs. The ram figures agree with those of last year, namely polled superiority in all three ewe groups in clean fleece weight.

Sheep Nutrition Experiments.—This experiment was suspended during the year owing to the severe incidence of foot rot in the experiment sheep.

Wollongbar Experiment Farm

Very satisfactory progress has been made in the development of Wollongbar Experiment Farm as a research centre in investigation of some of the problems of the dairy, pork and bacon industries of the upper north coast.

Vetch Grazing Trials.—A small pilot trial was undertaken during winter and spring 1955-56 and as a result a large-scale milk-production experiment has been planned for the winters of 1957-58. The vetches were sod-seeded into the pasture in late-autumn 1956, but unfavourable seasonal conditions affected the yield. The project is still current.

Skim Milk Feeding of Young Calves.—In this experiment skim milk fortified with vitamin A was fed from three to four days of age. Severe diarrhoea was encountered and the experiment had to be discontinued.

Deep Litter for Pigs.—A series of experiments has been undertaken to determine the relative merit of rearing pigs on deep litter in concrete pens and in soil yards. The difference obtained in the response of pigs in the two treatments was not significant, and could be attributed largely to the high standard of hygiene and management maintained in the piggery.

Restricted Feeding of Pigs.—A series of trials is in progress to determine the optimum rate of meal feeding to pigs of the Wollongbar strain and different stages of growth and fattening.

Vitamin A Requirements for Pigs.—Collateral experiments have been in progress at both Wollongbar and Grafton Experiment Farms to ascertain the relative merits of green feed and vitamin A feeding in rearing and farrowing of pigs under north coast conditions. It has been found that Vitamin A incorporated in the diet of meal-fed pigs can adequately replace green feed. Whether it is economical would depend on the size and management of the piggery, but it can be profitable.

Grafton Experiment Farm

Brewers Grain for Pigs.—Three trials have been conducted and a fourth is in progress to determine the value of brewers grains in the diets of pigs.

It has been found that up to 25 per cent. of the meal can be replaced by brewers grain from weaning to bacon weight without ill effect on growth rates and feed conversion. Substitution at the rate of 50 per cent. in the ration of weaners causes a significant decline in the rate of growth.

Condobolin Experiment Farm

Fixation of the Border Leicester x Merino.—This project was commenced in 1955 when the required sheep were obtained. The aim of the project is to investigate the possibility of "fixing" the type of the Border Leicester x Merino. The first F1 generation was lambled in autumn 1956 when selections were made. Further culling of both F1 ewes and rams has since taken place and the second F1 generation was lambled in autumn 1957.

Poultry Experiment Station, Seven Hills

The position of second Livestock Research Officer remains unfilled. Mr. M. W. McDonald B.Sc.Ag., who is undertaking a post-graduate research degree in the Department of Genetics, University of Sydney, maintained his association with the research programme at Seven Hills.

Genetic Variation in Nutrient Requirements.—Genetic variation in nutrient requirements have been investigated. Data from a number of experiments have been analysed and collated, showing differences between White Leghorns and Australorps in requirements for folic acid and in resistance to

rickets due to profound calcium and phosphorous deficiency. Differences between Seven Hills and H.A.C. White Leghorns have been found in response to level of protein in the diet and in incidence of haemorrhagic disease. Both the previously observed difference between the breeds in response to methionine and in folic acid requirements have been further investigated. The failure to respond to methionine in Australorps has been shown to be sex-linked recessive, and the biochemical mechanism found to be an inability to synthesise cysteine from methionine. The breed difference in folic acid requirements has been found primarily due to the above folic acid requiring transformation, but when the effect of this was removed statistically there still remained a residual breed difference. This is being further investigated.

Use of Methionine.—The use of methionine as a feed supplement in commercial broiler-type mashers has been investigated further. It has not been found possible to produce a satisfactory mash that does not require methionine supplementation. A more extensive investigation to obtain data under commercial conditions has commenced.

Leg Weakness Syndrome in Chickens.—During 1956 a new disease, called leg weakness or "lazy legs", was observed by broiler growers. It was found possible to produce the disease in the laboratory by feeding a large excess of bone meal. It was established that affected chickens recovered within five minutes of exposure to sunlight, so it was concluded a defect of vitamin D metabolism was involved. Neither the use of excess vitamin D₃ nor of water soluble or oil-dissolved D₃ had any effect, but excess manganese reduced the number of experimental cases by 40 per cent.

Importance of Early Environment in Performance of Layers.—This has been further investigated. Pullets whose growth rate was retarded by feeding low protein starting and rearing diets have been tested for one laying season. The treatment delayed sex maturity by approximately 14 days but had no effect on intensity of laying.

Vitamin D for Winter Egg Production.—This has been further investigated. Contrary to the results of 1955, vitamin D produced no effect in egg production in the 1956 winter. Examination of meteorological data showed that 1955 had more dull days during the experimental and pre-experimental periods.

Low Protein Meatmeals.—Further data on the effect of these meatmeals on egg production has been collected. The results show a marked effect in egg production during winter, but no effect in spring. Shell quality was improved when these meatmeals were fed.

Antibiotics for Egg Production.—An investigation of value of Terramycin as a feed additive for layers has been commenced. Early results show an increase of approximately 10 per cent. in egg production among birds receiving the antibiotic. It is hoped to investigate the effect of this additive on rotting of eggs in store.

Breeding Project—Egg Production of Crossbred Hens.—Heavy losses among the Australorp lines prevented a further cycle of testing being commenced in 1956. However, the interval during multiplication of the lines is being used for the production of an 8 x 8 poly-allelic series of matings for testing to determine the importance of additive and non-additive combining ability between and within breeds in this flock. A further cycle of recurrent reciprocal selection will commence with the 1957 breeding season.

Beef Cattle, Horses and Goats Section

Representation.—The Principal Livestock Officer continued to represent the Department in the following breed societies:—

- Arab Horse Society of Australasia.
- Aberdeen Angus Society of Australia.
- Goat Breeders' Society of Australia.
- Poll Shorthorn Society of Australasia.
- Commonwealth Clydesdale Horse Society.

Fat Stock and Carcase Competitions.—Officers of this Section were concerned with judging on the hoof or on the hook. Added local interest in these competitions is being shown, so they are assuming greater extension value. Competitions were held at the following seven centres and the number of entries in each is indicated in parenthesis: Wagga (13), Goulburn (21), Dubbo (8), M.I.A. (19), Grafton (17), Macksville (23), Casino (42).

Field days to demonstrate quality, etc., on the hoof and on the hook were well attended at all centres.

Beef Cattle Breeders' Competition.—This competition has been conducted for the fifth successive year. It is sponsored by the Rural Bank of N.S.W. and the Agricultural Bureau of N.S.W.

Officers of this and other livestock sections, and of the Rural Bank, have acted as judges.

Radio and country press and journals have formed an important medium for the Section's extension activities and most officers have made contributions through these channels. The Principal Livestock Officer took part in a television programme featuring quality in beef.

At Wagga Agricultural College, a judging competition of beef cattle was held, for students and Junior Farmers, and at Bombala, the Special Veterinary Research Officer (Beef Cattle) explained the project and interim results of the beef cattle improvement work being carried out on two properties in that area. This officer also lectured at the Pasture and Animal Husbandry School at Inverell and the Principal Livestock Officer addressed gatherings at the Annual Congress of the Agricultural Bureau of N.S.W. at Hawkesbury Agricultural College and at the Lachlan Convention of the same organisation.

An important extension item was the five-day Beef Cattle School at Yanco Experiment Farm, attended by 20 students from widespread centres in the southern half of the State. This was a most successful school.

Dr. R. T. Clark, Fulbright Fellow, U.S.D.A., was conducted on a tour of beef cattle areas and investigation centres of N.S.W. Several other important visitors have been conducted on tours of inspection of the Department's beef cattle studs.

Investigation work.—The incidence of a condition known as bent-leg in goats which has caused considerable wastage in young goats, particularly bucks, at Condobolin Experiment Farm, was investigated at that Farm. It was suspected that the condition depended on either a mineral imbalance or deficiency. The investigation appears to indicate that a calcium/phosphorus imbalance is the cause of the trouble. In two comparable groups, each of ten young Saanen bucks, nine in one group given a ration with a wide Ca/P ratio developed bent-leg, whereas in the other group receiving a ration with a narrow Ca/P ratio, no cases occurred.

Studies on growth rates of beef cattle under prevailing systems of management were continued at Leeton Experiment Farm and Belubula Farms, Canowindra. Evidence over a number of years shows that in pasture improvement areas of N.S.W. an average growth rate of 1.5 lb. per head per day (from weaning to 20 months of age) in young beef cattle raised on pasture, represents the most that can be expected. To improve upon this performance, some special treatment (supplementary feed, hormones, etc.) appears necessary.

Observations have been made on water requirements of beef cattle grazing on irrigated improved pasture, on the relative performance of steers as against heifers, and growth rates in relation to season waves of pasture growth at Leeton.

At the same centre initial investigations have been made into the effects of stilboestrol and hexoestrol implants in growing and fattening beef cattle. Similar work is under way on a private property in the Griffith area. Thus far there are indications that implantations with these substances lead to an increased rate of daily gain in the region of 0.5 lb. for periods up to at least two months. This work is continuing.

Observations on the breeding efficiency of beef breed cows, particularly in relation to the economics of early determination of pregnancy and early disposal of "empty" cows, are under way at Duck Creek and at Belubula Farms.

Material for the evaluation of stud sires in use in the Departmental beef cattle studs, and for record of performance tests on young bulls bred in these studs, is being collected.

Project 108, "Beef Cattle—Improvement of Breeding Stock", under the Agricultural Extension Grant, which is in its second year on two private properties in the Bombala district, is continuing. In broad terms the aim is to demonstrate that in commercial beef cattle production, selection of female breeding stock should be based on the mothering ability of the cows and the growth rates and confirmation of the calves. The type of demonstration being carried out also provides material for progeny testing of the sires in use. This work is being continued.

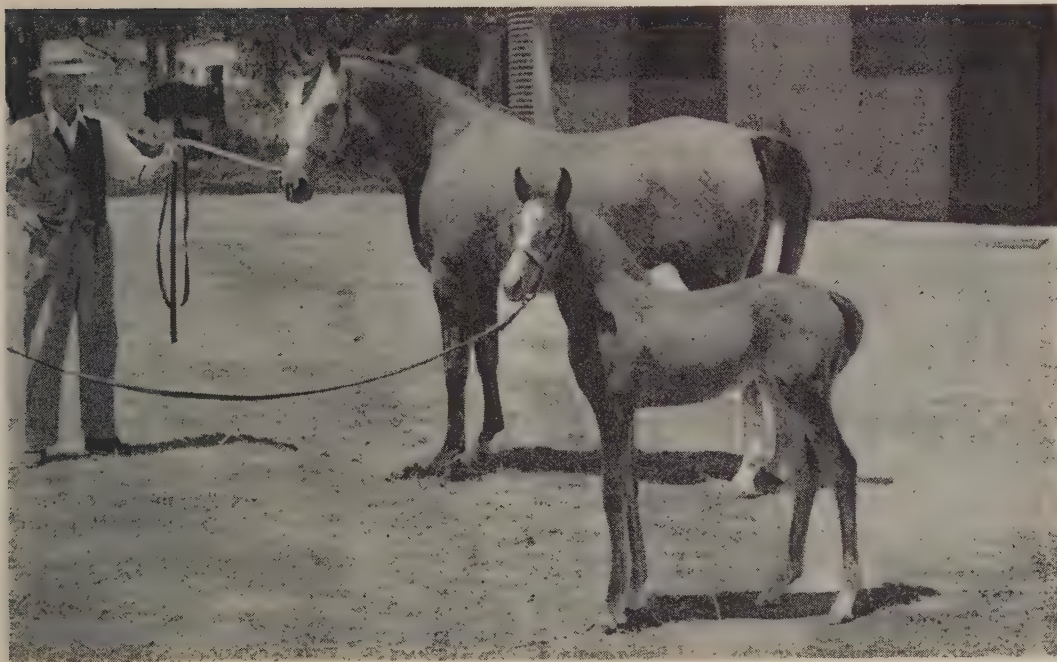
Horses.—Overall horse numbers on Departmental institutions have fallen during the year from 273 to 257.



Nutritional Disorders

The Department's veterinary research staff is constantly investigating nutritional disorders. Leg paralysis in chickens and "bent leg" in goats are two conditions caused by faulty nutrition.

(Photo. from Division of Animal Industry.)



Imported Stud Stock

First foal sired by the Arab stallion Razaz (imported by the Stud Stock Buying Delegation) was born December 7, 1956, at Trangie Experiment Station.

The dam, Dione, with this filly foal, Synoecia, at foot won the Arab brood mare class and was reserve champion Arab mare at the 1957 Sydney R.A.S. Show.

(Photo. from Division of Animal Industry.)

Heavy horse breeding has now been concentrated at Hawkesbury Agricultural College, the small Clydesdale stud at Trangie Agricultural Experiment Station having been transferred to and amalgamated with a similar unit at Hawkesbury Agricultural College.

Arab horses are being bred at both Wagga Agricultural College and Hawkesbury Agricultural College and during the year a redistribution was made of the breeding stock between these centres. Two stallions are located at each College.

The imported Arab stallion, Razaz, got his first foal in December, 1956, and its quality and conformation is all that could be desired. The mare, Dione, with this foal at foot won the Arab brood mare class and was reserve champion Arab mare at the 1957 R.A.S. Show. At the same Show, Razaz (imp.) was Champion Arab stallion for the second year in succession. Another mare, Hestia, was placed second in the class for mares four years old and over.

The following figures indicate the popularity of Departmental stallions which are available for service of privately owned mares:—

	W.A.C.	H.A.C.	Total.
Mares received for service	87	38	125
Number for free return service	7	8	15
Number of mares not served	8	1	9
Number put to—			
Sala (imp.)	...	28	28
Genghis Khan	...	6	6
Razaz (imp.)	46	...	46
Prometheus	33	...	33
Kirkbride Choice (imp.)	...	3	3

Of Departmentally owned mares, four were put to the Clydesdale stallion and nine (eight Arab and one hack) to the Arab stallions at Hawkesbury Agricultural College. At Wagga Agricultural College 15 Arab mares and four others were joined to the Arab stallions. These figures refer to the 1956 horse breeding season.

Stud Goats.—A decision to dispose of the Toggenburg stud will allow for better utilisation of available facilities by concentrating efforts on one breed only.

Production figures for does during the past year have been most satisfactory. No records were created but the average production of the herd was high.

Because of financial stringencies no goats were exhibited at the 1957 R.A.S. Show.

There is a ready sale for all surplus stock at Condobolin.

During the year under review, 26 does were sent to Departmental bucks for service, one of which did not come in season and was returned unserved.

The Principal Livestock Officer judged the goat classes at the 1956 Melbourne R.A.S. Show.

Stud Beef Cattle.—The small Aberdeen Angus stud which has been in existence at Hawkesbury Agricultural College about seven years was dispersed by public auction in April, 1957. The proceeds of this sale have been used to purchase Poll Hereford cattle, a herd of which is to replace the Aberdeen Angus stud at Hawkesbury Agricultural College.

The Trangie Aberdeen Angus stud has enjoyed outstanding success in recent years. The female section of the stud, after many years of selection and culling, has reached a high standard. A trio of sires in use at the stud are perhaps the most outstanding in Australia at present. They are made up of one imported bull and two bulls bred in the stud, both of which have been Supreme Champions at Sydney Royal Shows. All three sires are producing outstanding calves whose standard has not been equalled in the stud in postwar years.

During the year the imported bull, Erison of Harviestoun, died. This bull was mainly responsible for the high status that the stud enjoys today. An equally important and well-known cow, Trangie Miss Prim 2nd, the dam of several of the best individuals produced at Trangie, also died.

The demand for young bulls from this stud has remained high, and orders for bulls cannot be satisfied. A record top price for an Aberdeen Angus bull sold by the Department was achieved at the 1957 R.A.S. Show for the 21-month-old bull, Trangie Anthony 3rd.

A team of six young bulls and two heifers was exhibited at the 1957 R.A.S. Show. Only two third prizes were gained but the quality of the exhibit was nevertheless uniformly high.

A small exhibit was also made at the Parkes Show where first prize for the Aberdeen Angus bull over two years, Champion Aberdeen Angus bull, Grand Champion bull of all beef breeds, and the prize for the most outstanding beef cattle exhibit, were obtained.

The small Aberdeen Angus stud at Grafton Experiment Farm is still being used as a testing unit for potential stud sires and in this respect is proving of great value.

At the Duck Creek Sub-station of Wollongbar Experiment Farm, the Aberdeen Angus breeding unit continues to be built up and should soon reach the objective of approximately 100 breeding females. This unit is being used to produce even lines of weaners for experimental purposes.

The Poll Shorthorn stud at Wagga Agricultural College is making steady progress. Progeny of the two imported bulls, Birmingham Nugget 3rd (P) (imp. Can.) and R. B. Collynie Supreme (P) (imp. USA) are just coming forward and are right up to expectations. It will be some time before final assessment of the breeding worth of these sires and the five imported females can be made. Meanwhile, the stud is attracting considerable public attention.

Birmingham Nugget 3rd (P) (imp. Can.) and a home-bred bull were exhibited at the 1957 R.A.S. Show. The first-mentioned bull gained second prize in his class. An exhibit of Poll Shorthorns was also made at the Wagga Show where a creditable performance was achieved.

Commercial Beef Cattle.—The main source of supply of these cattle is Duck Creek. Surplus and cull cattle from other beef studs and also from dairy studs make up the supply of commercial cattle, which are needed for investigational purposes, as grass eaters on Departmental institutions and for ration beef supplies at the Agricultural Colleges.

Apiculture Section

Spring and summer honey crops were mainly light, with the result that honey was in very short supply during January and prices advanced as high as 1s. 5d. per lb. wholesale. It is difficult to recall a time when honey was in such short supply at that time of the year. However, the dry conditions during autumn and early winter favoured honey production and supplies increased.

Staff Position.—There have been no transfers, appointments or resignations during the current year.

Bee Diseases.—A number of outbreaks of American Foul Brood disease (*Bacillus larvae*) were located and brought under control. The most serious outbreaks occurred in the Bathurst, Albury and Burrigorang districts. Minor outbreaks of the disease were controlled in the metropolitan, Wollongong and Inverell districts.

Sac Brood.—A virus disease of bees weakened thousands of hives in the north-west. There appears to be a definite relationship between sac brood and supplies of pollen and nectar from Darling Pea. The disease is generally most troublesome when bees are working Darling Pea extensively. Officers of the Apiary Branch investigated the heavy losses and obtained samples of pollens and bees for research work. Pollen from affected hives was found to have deficiencies.

Nosema Disease.—Owing to drier autumn conditions the incidence of nosema disease was lighter than in the previous two years.

Apiaries Act, 1916-44.—Apiary Officers continued to carry out inspections of apiaries to ensure that beekeepers are complying with the requirements of the Apiaries Act.

Departmental Apiaries.—Plans are being prepared for a new Honey House at Wagga Agricultural College. The proposed building is designed to provide for student instruction.

In addition suitable display and storage space has been incorporated.

The new building also makes provision for investigational work to be carried out.

The programme of breeding better bees is proceeding despite unfavourable seasonal conditions throughout most of the year. The apiarist at Hawkesbury Agricultural College constructed a microscope projecting unit which he is using in anatomy studies relating to bee-breeding work.

Extension Work.—Officers contacted as many beekeepers and farmers as possible and assisted wherever practicable.

A successful Summer School in Apiculture was held at Hawkesbury Agricultural College during January. In addition to beekeepers from the State, two Indians, Fellows under the Colombo Plan, also attended.

Statistics of the Apicultural Services.—

	1955-56.	1956-57.
Lectures and Demonstrations	68	96
General Inspection of Apiaries ...	1,020	906
Apiaries Infested with Wax Moth	40	33
Apiaries Infected with Brood Disease	15	20
Notices for Adjustment of Hives	57	43
Certificates Issued for Inter-State Trade in Honey	188	75
Quantity of Honey Exported to Queensland	2,063,740 lb.	683,630 lb.
Beekeepers Registered	3,853	3,777
Protected Apiaries Registered ...	53	45
Apiary registration fees collected...	£2,706 16s. 8d.	£2,533 0s. 0d.

Co-operation.—Apiary officers co-operated with members of other branches and departments wherever practicable and members of the branch again played a prominent part in arranging and conducting demonstration at the R.A.S. Show.

Poultry Section

Production Trends.—Early in the year the downward trend in egg production continued. However, the number of pullets raised during 1956, was approximately 15 per cent. greater compared with 1955, and production markedly increased during autumn.

Other contributing factors were the warm dry weather conditions, the wider adoption of the laying-cage system and a high standard of efficiency on most farms.

N.S.W. Poultry Improvement Plan (Eggs).—Breeders accredited under this Plan are co-operating satisfactorily. It is expected that the present number of 16 breeders will increase as egg producers realise the advantage of genetic improvement of commercial laying strains.

Breeders will submit 40 day-old pullets for random sample testing at Hawkesbury Agricultural College during August, 1957, and equipment and plant for testing this stock has been completed from the funds of the Agricultural Extension Grant.

The present number of approved breeders is adequate to supply a very large proportion of the poultry industry with pedigreed stock.

The next procedure will be to accredit approved multiplication farms and hatcheries when chickens of better genotype are obtainable from breeders next year.

Demonstration Projects—Agricultural Extension Grant.—Three demonstrations are being continued in the Tamworth-Kootingal area:—

- (1) Housing layers in both tiered cages and Californian cage shelters to demonstrate the high food utilisation efficiency and better production from this system of housing.
- (2) Intensive housing in small flock units of 40 layers to demonstrate better production compared with larger flocks.
- (3) Free choice feeding with high protein mash as a supplement to wheat feeding.

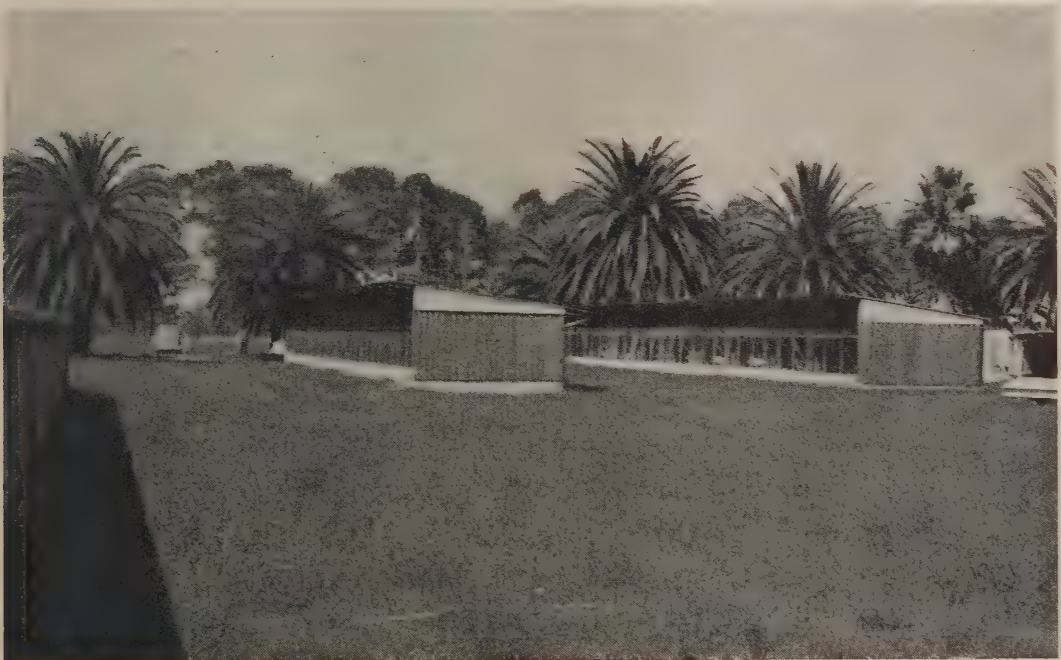
Satisfactory results have been obtained from all three demonstrations, which have created much interest among producers in this area where all methods are being employed. It may not be necessary to continue these demonstrations after next year.

Egg Laying Competitions.—The Egg Laying Competitions at Hawkesbury Agricultural College are conducted in three separate Divisions to compare the relative merits of the different methods of housing poultry.

These are:—

- (1) Three-tiered indoor cages.
- (2) Californian, step-tiered cages.
- (3) Groups of six birds on litter housed intensively.

This test is distinct from the Open Random Sample Test whereby 40 chickens are selected at random from the incubators of commercial hatcheries and reared and tested at the College.



Random Sample Test Pens

Random Sample Test pens at Hawkesbury Agricultural College are used to rear and test chickens selected at random from commercial hatcheries. The aim is to determine the true productive capacity of poultry strains.

(Photo, from Division of Animal Industry.)

Extension Services.—The three District Livestock Officers stationed at Cumberland, Parramatta-Wyong and Tamworth have done everything possible to cope with demands for advice, give lectures and demonstrations and supervise the work connected with the Poultry Improvement Plan.

The services of these officers indicate to some extent their activities and the assistance afforded producers.

Visits to private farms	890
Number of stock culled	38,000
Number of breeding stock selected	8,300
Visits to Government institutions	10
Field Days conducted	12
Lectures given	16
Judging at Shows	3
Visits to Departmental farms	24
Chick sexing examinations	1
Poultry Schools held at Hawkesbury and Wagga Wagga Agricultural Colleges ..	2

Poultry School.—The fifth Turkey Raisers' School and Convention was held at Wagga Wagga Agricultural College and Experiment Station. Over sixty people attended the School from all Eastern States and Tasmania. Unfortunately floods prevented some local growers from attending the School. The short-term Winter School for Poultry Farmers was held at Hawkesbury Agricultural College during June. The full complement of fifty students attended, the majority being actively engaged in commercial poultry farming.

Piggery Section

Industry Trend.—Farmers throughout the State found pig-raising most profitable during the first six months of the year. Thereafter pig prices fell leaving a bare margin of profit. The fall in production reported last year continued and it appears that a shortage of pig meats will develop during the next twelve months. Such a shortage is invariably accompanied by a rise in pig prices, and pig-raisers are accordingly confident about future prospects over the next year or two.

Departmental Pig Studs.—The pig herds at Hawkesbury and Wagga Wagga Colleges and Wollongbar and Grafton Experiment Farms were maintained at a satisfactory level of efficiency. Research work on nutrition problems was continued at Wollongbar and Grafton and sales of stud pigs were made after research requirements had been satisfied. With a view to economising in expenditure on pig-feed the herds at Hawkesbury and Wagga Wagga were reduced in size as in the following figures:—

	1954-55	1955-56	1956-57
Stud pigs sold	184	151	217
Market pigs sold	528	586	297
Pigs killed for food ..	367	425	285
Approximate value ...	£13,000	£17,000	£13,000

Show Teams.—Teams of pigs from Wagga Wagga College and Grafton Farm were exhibited at local Shows with success.

Swine Branding Act.—Considerable time and thought were devoted to the administration of this Act and many farms of disease-origin were located for remedial action. The number of such farms identified since the Act was brought into operation two years ago is approximately 4,000.

Detailed examination of claims under the Swine Compensation Act, 1928-1935, was also undertaken. The combined effect of this work is reflected in the greatly improved financial position of the Swine Compensation Fund.

Extension and Regulatory Services.—The following table illustrates the activities of Livestock Officers (Pigs) in carrying out their extension and regulatory duties:

	1954-55	1955-56	1956-57
Farms visited	1,152	1,135	1,144
Meetings attended	76	48	51
Pig sales attended	68	75	110
Field Days attended	32	35	45
Bacon factories visited ...	49	66	45
Experiment Farms visited .	93	86	59
Shows attended	25	29	32
Lectures and demonstrations given	64	39	92
Stock Foods Act Inspections	12	2	—
Broadcasts	39	43	44
Inspections under Swine Branding Act, 1940 ..	—	—	77

In addition many enquiries for technical advice were also handled in person by correspondence and by telephone.

The Annual School of Instruction for Pig Raisers was again conducted at Hawkesbury Agricultural College and was well-attended by farmers from all parts of the State.

Visits were paid to institutions under control of the Departments of Prisons, Health, Education and Child Welfare and assistance was given in management of their pig-herds.

Technical advice was also furnished to various farmers' organisations, the Junior Farmers' Club movement, the Australian Pig Society and Agricultural Show Societies.

Sheep and Wool Section

Staff.—Effective strength of the Section (26) was reduced by one through secondment of a district officer to the position of Regional Supervisor, Tamworth.

Thirteen districts remain in operation.

Seasonal Conditions.—From July to November, above-average rainfall caused very unsatisfactory pastoral conditions over the whole of the State. From November on, wet conditions gave way to an extremely dry period which continued almost to end-June. Beneficial rains fell in the lower western, south-western and Riverina areas. Effective rainfalls have not been received in the other parts of the State, though isolated areas received falls that could be of benefit if followed by further falls.

The dry conditions through summer were extremely beneficial to stock. Many owners restored their stock and properties to some order after a period when constructive management was impossible.

An industrial dispute, together with seasonal conditions, delayed shearing in many early shearing districts. As a result, many clips were overgrown and of excessive length. In the early sales, there was considerable criticism of the clip by buyers on this count.

Dry conditions made it possible to combat the widespread incidence of footrot. Unfortunately, many owners did not grasp the full opportunity to implement eradication programmes on affected properties.

With the dry conditions and virtual absence of wind, water supplies became a major problem of many properties. Water storage must receive more attention in the future, particularly in pasture-improved areas which depend on surface storage and where run-off may not be sufficient to replenish water supplies.

Incidence of fleece rot was much lower. Sheep owners are becoming more aware that the better handling wools are less subject to this condition.

Spring lambings again were very satisfactory in most districts. There were heavy neo-natal mortalities under some conditions, especially where the level of nutrition rose appreciably early in pregnancy then declined towards lambing. Autumn lambings were variable, and seem largely dependent on the nutritional status of the ewes at mating and approaching parturition.

Several instances of very disappointing autumn lambings in stud Dorset Horn ewes came under notice. Much of their trouble may have been a heritage from the abnormal seasons experienced. If the trouble persists in more normal seasons, it may result in abandonment of stud breeding in environments where it is difficult to control the nutrition of the ewes.

Drought and supplementary feeding became necessary in autumn. Many properties had inadequate reserves of conserved fodder and could provide only token feeding.

Owners showed greater interest in arriving at an adequate ration for their stock. Many inquiries on drought and supplementary feeding were answered in Head Office and by district officers.

The excessive rains resulted in a widespread increase in noxious weeds. Noogoora burr, which very adversely affects the value of wool, has spread alarmingly.

Industry Trends.—The swing towards lamb production has steadied down considerably. This has been caused by shortage of breeding rams and ewes, and the appreciation in wool values.

The trend for breeders of Border Leicester cross Merino first cross, to retain the ewe portion of the drop for eventual sale to lamb-raisers, has continued. In spite of very heavy Victorian competition, this has made the supply position for crossbred ewes slightly easier for breeders of this type. Prices for crossbred ewes and ewe lambs are still at a premium, which makes it worthwhile for the breeders to retain the ewe lambs.

The shortage of British breed sheep was alleviated, to a degree, by importation of some 3,000 ewes and rams from New Zealand. Border Leicester, Southdown and Cheviots were the main breeds concerned. However, the quality of many of the imported sheep was relatively low, and would not contribute to raising the standard in this State.

Prices for British breed flock rams remained steady, one good feature being absence of high prices for flock rams at auction. Paddock prices for Border Leicester flock rams increased but those for other breeds remained steady.

Use of crossbred rams has increased, an inevitable result of the shortage of British breed rams and the high prices. In some cases, quite good results have resulted from use of crossbred rams, but in instances where there was little discrimination, results have been very unsatisfactory.

There has been a remarkable increase in popularity of the Cheviot. This, however, has occurred without any certainty on the extent and ultimate use of this breed in the sheep-raising pattern of the State. The hardiness, activity and milking capacity of the Cheviot can probably be used to advantage in the environments.

Auction sales of Cheviot sheep have resulted in high prices paid for breeding stock. Many of the newly-established studs have little chance of their studs being anything more than an expensive hobby.

Perhaps the most significant production trend is that husbandry and management methods are being directed towards better use of available resources, both sheep and pasture. Wider adoption of this concept must make a very significant contribution to increased production.

There has been an increase in sheep on horticultural farms in the Murrumbidgee Irrigation Area. The wet conditions resulted in tree mortality and pastures are being established for lamb production.

Autumn shearing in tableland areas has become more common. The main objective is to have the ewes carrying less wool at lambing. With this practice, neo-natal mortalities in lambs have been reduced.

There is evidence of greater interest in fodder conservation but not enough to ensure that all sheep-owners in the more-favoured districts will have sufficient fodder for the necessary supplementary and drought feeding. There has been appreciable interest in making grass silage. Silage, with pasture hay and grain, appears to be the ideal conservation programme.

On the northern tablelands, particularly, there has been a noticeable increase in the number of British breed studs. This is evidence of the development of the potential for lamb production there.

With the use of the newer insecticides, Aldrin, Dieldrin and Diazinon, as a preventive, and the widespread use of the Mules operation, the blowfly has become a problem of minor importance provided each operation is done thoroughly. A number of instances have been reported where the Mules operation has been abandoned following the protection provided by the newer insecticides. This tendency should be discouraged.

While branding of sheep is becoming less general, use of SI-RO-MARK branding fluid is virtually universal.

Extension Work.—There was an increase of over 50 per cent. in the number of properties visited by district livestock officers, due to the greater emphasis being placed on management and fuller use of available resources.

A significant feature has been a 90 per cent. increase in use of radio and the press as an extension medium. However, discussion of specific problems on individual properties is still considered the most effective and permanent extension medium.

The extension work of district livestock officers is summarised:

	1955-56	1956-57
No. of properties visited	2,014	3,126
Sheep classed	332,832	275,798
Rams and ewes selected for breeders	7,316	4,736
Value of rams and ewes selected for breeders	£91,520	£60,668
Sheep selected for War Service Land Settlers	5,869	7,121
Value of sheep selected for War Service Land Settlers ..	£23,091	£33,099
Visits to War Service Land Settlers	206	181
Lectures, Demonstrations, Field Days	221	206
Agricultural Shows, Ram Sales, etc.	88	83
Radio Broadcasts	82	155

Competitions.—The Merino Ewe Competition, conducted by the Department in conjunction with the "Farmer and Settler" newspaper, again attracted excellent entries. The new fleece section of the competition proved very successful in promoting further interest in wool improvement.

The Lamb Breeders Competition, conducted by the Department in conjunction with the Rural Bank, attracted record entries. Quality and evenness of prizewinning entries were the highest standard yet judged.

Satisfactory entries were received in the Lamb Carcase Competitions conducted at Wagga, Goulburn and Dubbo Abattoirs.

Combined Beef Carcase and Lamb Carcase Field Days were conducted at each abattoir and were very successful.

Sheep Industry Projects at Experiment Farms, Stations and Colleges.—

Leeton Experiment Farm.—The number of breeding ewes has been increased to 1,700. Spring lambing has been expanded to achieve greater pasture utilisation by the grazing animal. The following trials are current:—

1. *Early Lamb Production.*—A comparison of the performance of Border Leicester Merino cross and Dorset Horn Merino cross ewes when mated to Dorset Horn rams.
2. *Economic Trial.*—Breeding from ewe lambs in comparison with the standard practice, evaluation of results to be on the return per ewe over their economic lifetime.
3. *Double Lambing Trial.*—A pilot trial to obtain information on breeding performance.
4. *Spring Lamb Production.*—This project to date has demonstrated that the production of spring-drop lambs on irrigation environment can make a worthwhile contribution to production through better use of the spring flush of pasture.

The experiment programme at Leeton has yielded extremely valuable extension material of general use in the industry and of particular use in formulating a management pattern for lamb production in other irrigation districts.

Yanco Experiment Farm.—

1. *Commercial Trial, for Early Lamb Production.*—A comparison of Romney, Merino, Border Leicester Merino and Corriedale ewes for early lamb production. Incorporated in this trial is an experiment to compare the results obtained from the use of a controlled nutritional plane with those with an ad lib. nutrition.
2. *Spring Lamb Production.*—Designed to obtain information on the merits of Southdown and Dorset Horn rams mated to Dorset Horn cross Merino and Border Leicester cross Merino ewes. Also incorporated in this trial is the comparison of the mating of maiden ewes to a small breed of ram (Southdown) with a larger breed (Dorset Horn). A further trial in which the ewes and lambs are grazed on different types of pasture has yielded valuable information. Lambs were successfully marketed from dry subterranean clover and Wimmera rye grazing.

Condoblin Experiment Farm.—

1. The first drop of the F1 generation will be mated in November, 1957. Final selection of ewes and rams will be made after the shearing date is reviewed.

Despite dry conditions, the current drop of lambs in this project are doing reasonably well. It is hoped that approximately 350 ewe lambs from this year's drop will be available for future work.

2. The supplementary and drought feeding areas have been fully fenced and it is hoped that the water supply to these areas will be installed in the near future. When water is available, preparations can be made for commencement of this work. At present, both areas are carrying a heavy body of dry matter. It will take some time to bring the areas into suitable condition for the work to be undertaken.

New England Experiment Farm.—

1. The investigation into the relative economy of dual-purpose breeding in comparison with lamb raising has been concluded. The ewes are now being used for breeding Dorset Horn Corriedale cross ewes which will be used in future lamb-raising investigations.

2. Comparison of the Border Leicester Merino cross and Dorset Merino cross ewes mated to Dorset Horn rams in the New England environment. The information from this work will be of value in setting a pattern of lamb production in this area.

Temora Experimental Farm.—The Poll Dorset flock has been accepted for registration with the Poll Dorset Association of Australia as a foundation flock.

After many years, completely polled rams were bred last year. These rams are being tested in current matings. In the 1957 drop of lambs, six poll and six near-poll rams have been bred.

With the occurrence of reasonable number of poll rams, selection of a ram or rams homozygous for the poll character is probable.

Trangie Agricultural Experiment Station.—All sheep in this Station are used in breeding trials and research work in Merino sheep production and in investigating the inheritance of sheep and wool characters.

Shannon Vale Nutrition Station.—

1. Investigation work into the nutrition of Merino sheep for wool production and breeding performance in the New England environment.
2. Studies of the effect of improved nutrition on growth and reproduction of Merino sheep.
3. Investigation into the effect of varying nutritional planes on the breeding performance of Romney Marsh and Merino ewes.
4. Comparison of Cheviot cross, Romney Marsh cross and pure Romney Marsh ewes.
5. Cheviot cross Merino sheep have been bred, the ewe portion being retained for future use in lamb production.

At the weaner stage, the Cheviot Merino was distinctly disappointing. They showed much of the Merino conformation on a considerable amount of wrinkling. Further evidence is required before a sound assessment of these sheep can be made.

Cowra Experiment Farm.—Lamb raising experiment work has been undertaken. A comparison is being made of the results of mating maiden Border Leicester Merino, Romney Merino and Corriedale ewes to Southdown and Dorset Horn rams.

An experiment in weaning lambs destined for market is being undertaken. Results will be interesting as it may indicate that more effective use of feed can be achieved by weaning of lambs and the return of these ewes to a maintenance plane of nutrition.

DIVISION OF DAIRYING

The activities of the Division in general concerned administration of Acts and Regulations, herd production improvement activities, extension and research affecting the efficiency of the dairying industry.

1956-57 seasonal conditions were generally unfavourable to dairying in the main butter and cheese producing districts, owing to exceptionally dry conditions during winter, spring and early summer, and a record dry autumn. Despite this, milk production for the year was only approximately 10 per cent. less than the postwar record production of 1955-56. Comparison production figures are:—

	1955-56	1956-57
Milk ..	335,000,000 gals.	308 million gals. (approx.)
Butter .	91,916,099 lb.	75,772,093 lb.
Cheese	7,569,106 lb.	9,002,981 lb.

Dairy officers continued a concerted drive to improve the quality of milk and manufactured products, particularly butter, by check-grading at factories, by farm instruction, press statements, radio talks and general extension.

Flood Relief

Dairy Officers investigated flood relief claims carried over from the previous year, on behalf of the N.S.W. Flood Relief Committee.

Regulatory Services

DAIRY INDUSTRY ACT, 1915-51

Advisory Committee.—The Dairy Produce Factories Advisory Committee met three times to consider applications for registration and variation of registration of the purposes for which five dairy produce factories could be used. Four applications were approved and one rejected. At 30th June, 1957, there were 104 registered dairy produce factories and 68 registered dairy produce stores.

Appeal Board.—The Appeal Board, constituted under section 24 to deal with appeals against decisions of inspectors under the Act, did not have cause to meet.

Registration of Factories and Stores.—Plans and specifications of proposed dairy produce factories and/or stores, and for alterations to existing factories, were submitted for approval to specialist officers. Factory plant, buildings and machinery were kept at a satisfactory standard of construction and hygiene by co-operation of factory managers, directors and Departmental dairy officers. The registrations of three dairy produce factories were cancelled as they had ceased to operate for the purpose for which they were registered.

Certificates of Competency for Dairy Factory Operatives.—Six Dairy Science Schools were held at various centres with a total attendance of 91 candidates. Examinations of factory operatives for certificates of competency were also held elsewhere, and certificates were awarded on the results obtained at Dairy Science Schools and elsewhere, as follows:—

	Examination of Dairy Factory Operatives.	Dairy Science Schools.
Cheese Making	5	—
Milk Grading	39	—
Butter Making	39	—
Cream Grading	—	42
Milk Testing	—	39
Cream Testing	—	38

Butter Manufacture and Grading.—The butter grading staff made regular examinations of butter and cheese manufactured in N.S.W. received at Sydney and Newcastle for distribution and storage prior to sale on the local market, also at Casino and Lismore prior to storage for winter use. The resultant information in each case was furnished to factory managers and district dairy officers to help overcome any quality faults or other defects noted at the grading examination.

At the request of selling agents, the quality of practically all butter brought from other States to supplement local production was also checked by the grading staff.

The number of boxes of butter from interstate and N.S.W. sources examined by the State grading staff totalled 1,378,815 compared with 1,429,000 last year.

Officers served as judges and stewards in the dairy produce section at the Royal Agricultural Society's Show, the North Coast A. and H. Society, Lismore, and the competitions held in conjunction with the Annual Conference of the Factory Managers and Secretaries' Institute, N.S.W. Division, as in previous years.

Regular analyses of moisture and salt content of butter manufactured in N.S.W. factories were carried out. These were 15.4 per cent. and 1.46 per cent. respectively.

The percentage of choicest butter manufactured from cream, based on conditions set out in terms of the Department's Order of Merit published each year for the information of factory managers, was 83 per cent. Comparative figures for the previous four years were:—1952-53, 93 per cent.; 1953-54, 83.3 per cent.; 1954-55, 78.8 per cent.; 1955-56, 78 per cent.

Certificates of Merit.—Certificates of Merit of the Department are awarded to butter factories which, in a given twelve months period, submit for grading a given percentage of their total "choicest" brand production and of which 92 per cent. is, after grading, found to be true to brand description. The number of factories which have been awarded certificates of merit over the last five-year period are as follows: 1952-53, 5; 1953-54, nil; 1954-55, 3; 1955-56, 2; 1956-57, 2.

Milk and Cream Quality.—Officers visited dairy produce factories to check-grade milk (356 visits) and cream quality (711 visits). As a result of these checks, 4,125 farms were visited to advise farmers how to overcome the defects. One hundred and twenty-four special visits were paid to factories, and 134 to farms in connection with milk, cream, butter, cheese and other products.

Margarine.—Licences to manufacture table margarine were issued to six manufacturers, four of whom own hydrogenation plants for converting oils to fats which enable the manufacture of margarine. Two thousand tons of table margarine were exported to other States. Permits to export table margarine to a total quantity of 8,750 tons were issued to firms; a total of 547 tons was actually exported.

Products other than Butter.—Consignments of cheese received at Sydney were graded regularly. Samples representing approximately 35,651 x 14 lb. cheese were graded. Cheese graded was of inferior quality. The gradings revealed that only one factory was making a choicest quality article. This factory, registered during 1955-56, had facilities which made it possible to pasteurise and manufacture under sanitary conditions and at correct curing temperatures and humidity.

Investigations of milk supplies and cheese quality were also made at various country centres. A survey of existing cheese-making methods in all districts has been instigated, covering all stages from milk received to the grading of cheese at the grading floors.

DAIRIES SUPERVISION ACT, 1901-1930

Before 1st March, 1957, dairy officers continued to inspect dairy premises and where necessary to issue orders for remedial measures to bring the premises up to required standard of construction. A total of 4,788 inspections were made and 219 remedial orders issued.

On 1st March, 1957, all shires and municipalities were proclaimed local authorities within the meaning of the Dairies Supervision Act, dairy officers then relinquishing the duties

of inspection of dairies. When requested, however, they acted in advisory capacity to the local authorities. Inspections after 1st March, 1957, of dairy premises and milk vending establishments other than dairies registered with the Milk Board and dairy factories registered under the Dairy Industry Act became the responsibility of the shires and municipalities.

PURE FOOD ACT

Three prosecutions launched for breaches of the Pure Food Act resulted in fines against the defendants.

FACTORIES AND SHOPS ACT

Dairy officers carried out inspections on behalf of the Department of Labour and Industry as affecting the provisions of amenities and protection of employees from dangerous machinery in dairy produce factories.

Herd Production Improvement Scheme

Herd Recording.—During the year seventy sub-units operated in the State, approximately 60,000 cows being recorded under the Group Scheme and 6,500 under the Official Section. It is expected that when final figures are available the numbers under Group will be down, due to difficulty in maintaining full staff during the year.

The following are comparative figures for the Group Herd Recording Scheme, for the past five years:—

GROUP SCHEME OF HERD RECORDING: FIVE YEARS' COMPARISONS

Year	Number of Cows Recorded	Average Butterfat Production per Cow	Cost of Scheme					
			Contributors			Total		
			Commonwealth Government	State Government	Participating Farmers			
		lb.	£ s. d.	£ s. d.	£ s. d.	£	s.	d.
1952-53	56,079	201.0	19,730 12 1	27,583 1 0	11,878 3 3	59,191	16	4
1953-54	58,667	186.0	16,301 12 4	24,182 7 8	24,722 9 6	65,206	9	6
1954-55	58,216	208.0	17,934 6 8	27,989 0 7	25,813 19 5	71,737	6	8
1955-56	65,000	215.0	19,879 14 0	31,619 18 9	28,019 3 3	79,518	16	0
1956-57	66,500			Not available.				

This is the first complete year for which punch cards have been used to record group herd results. They have enabled the unavoidable lag in this work gradually to be overtaken.

Calf Marking Scheme.—This scheme provides positive identification for female replacement stock, a basic need in herd improvement. During the year, 6,846 calves were marked, bringing the total so far marked to 50,305 in 1,390 herds, 126 new herds having adopted the scheme during the year.

Included in the total of calves marked are 1,534 calves "got" by artificial breeding; these include 549 for the year under review. Some 1,200 of the calves marked are in the Hunter District in herds serviced by the Aberdeen Cattle Breeding Centre; the balance are in the Berry area where there is room for a big expansion.

Certified Bull Scheme.—Additional applications for certificates during the year brought the grand total to 566 bulls; 388 certificates have been issued indicating eligibility of calves of those sires to be marked as merit calves.

Sire Survey.—The extraction of progeny records was continued but furnishing of results to farmers has had to be delayed until the records can be placed on to punch card equipment and results collated.

Herd Wastage.—Results covering the five-year period up to June, 1954, were published. Some three years' figures remain to be collated to complete the available data.

Artificial Breeding.—With the transfer to the Milk Board as the responsible authority for control of artificial breeding at Berry, the work of this Division in selection of bulls decreased considerably.

Dairy Bull Loan Scheme.—This scheme continued to function, but following the dispersal of the Hawkesbury College Jersey herd it is intended to gradually reduce the number of bulls under loan to a minimum and in future to use them with selected herds only.

Control of Government Herds

Government dairy studs continued to receive considerable attention during the year. Cattle exhibited at the 1957 Royal Show obtained their fair share of the prizes, including Champion Friesian Bull and Champion Guernsey Bull—animals imported by the last Stock Buying Delegation.

Provisional results in production recording for the year just ended indicate that results for the year will be the best ever obtained by Government herds in the postwar period. It is expected that results will be of the order of:—

Herd	Breed	No. of Cows	Butterfat
Yanco Experiment Farm	Guernseys	22. All ages	lb. 449
Wagga Agricultural College	Jerseys	37. " "	427
Hawkesbury Agricultural College	Friesians	35. " "	412
Grafton Experiment Farm	A.L.S.	39. " "	400
New England Experiment Farm	Jerseys	19. " "	362
Hawkesbury Agricultural College	Jerseys	35. " "	339
Bathurst Experiment Farm	Ayrshires	26. " "	329

A total of 220 cows averaging 8,690 lb. milk and 392 lb. butterfat.

Three proven sires are now located at Grafton Experiment Farm—"Grafton Mosaic", an aged bull that has been repurchased, "Tabbagong Camera" and "Grafton Maud's Camera" on loan to Farrer Memorial Agricultural High School.

Extension Services

Senior Dairy Officers' School.—A refresher school for senior dairy officers was held at the School of Dairy Technology at Hawkesbury Agricultural College. Eleven senior dairy officers

attended, were addressed by departmental officers, and derived benefit from practical work in various phases of dairy technology.

Dairy Science Schools.—Six dairy science schools were conducted to instruct factory operatives and examine them for certificates of competency in milk and cream testing and cream grading. Ninety-one operatives attended these schools.

War Service Land Settlement.—Estates proposed for allotment to ex-servicemen were inspected and advice was given to soldier settlers.

Dairy Farm Improvement Competition.—Various country centres were visited to examine and assess the work of seventy entrants for the Farmer and Settler Dairy Farm Improvement Competition, sponsored by the Farmer and Settler Newspaper.

Production Improvement Project.—Activities were maintained and a considerable number of farmers throughout the State obtained information and assistance in management of their dairy farms from dairy officers.

Milking Machine Efficiency Survey.—An officer stationed at Lismore and another at Taree carried out a survey of milking machine efficiency in the surrounding districts. Of 498 machines tested, a high percentage were found faulty in operation. These officers collected data for correlation and analysis by the dairy research officer at Hawkesbury Agricultural College.

In the course of the surveys farmers were advised of the faults found in the machines and of repairs, replacement of parts and adjustments necessary to bring their machines to satisfactory standard.

Testing of Air Flow Meters.—Some of the equipment required for operation of the Testing Station for Air Flow Meters at Hawkesbury Agricultural College was supplied. The station is expected to be fully equipped and ready for operation during the 1957-58 financial year.

Items of Interest.—Thirty items of interest were extracted from technical publications and distributed to various dairy officers and leading dairy authorities throughout the State.

General Extension.—Officers made 3,800 visits to farms for the purpose of general extension activities.

Dairy Industry Extension Grant

Monetary Allocation for N.S.W.—The allocation to N.S.W. under the Dairy Industry Extension Grant was £64,879. Unspent allocations brought forward from the financial year 1955-56 (£12,344 15s. 1d.) made a total of £77,223 15s. 1d. available for expenditure under the approved headings:—

- Grade Herd Recording.
- Shire Survey and Herd Wastage.
- Farm Demonstrations.
- Salaries and Expenses for Organising Officers.
- General Publicity.
- Punch Card Equipment.
- Survey—Efficiency of Milking Machines.
- Survey—Sterility in Dairy Cattle.
- Testing Station (H.A.C.) for Air Flow Meters, etc.
- Expenses—Mr. Parry Brown to attend International Study Centre.

Temporary Staff Engaged on Statistical Work.

Advisory Committee.—The work previously handled by this Committee has been attended to by Mr. McGillivray, Chief, Division of Dairying, Mr. J. Green, Acting Chief, Regional Extension Services, and Mr. E. Pantou, Senior Organising Officer, Dairy Industry Extension Grant. The services of appropriate officers of other Divisions of the Department have been co-opted when necessary.

Staff.—Two additional organising officers were appointed during the year with headquarters at Byron Bay and Grafton, and three survey officers with headquarters at Lismore, Taree and Kiama. The survey officers are engaged in collecting data under the milking machine survey.

Farm Demonstrations.—

Demonstrations current at 1st July, 1956	164
New Demonstrations approved 1st July, 1956-30th June, 1957	75
Demonstrations closed 1st July, 1956-30th June, 1957	107
Demonstrations current at 1st July, 1957	132

Drought conditions in dairying districts during late summer and autumn prevented sowing of pastures on several demonstrations and seriously affected the progress of others.

The success and effect on the dairy farming community of the demonstrations of improved pastures with irrigation, and demonstrations of silage making, was a pleasing feature of demonstrational work during this unfavourable period.

Publicity.—Matter was prepared covering herd improvement activities and Dairy Industry Extension Grant demonstrations for inclusion in the publication "Dairy Topics", which has a mailing list of 18,100. Dairy Industry Extension Grant activities, generally, were also reported in the weekly "Press Copy" and the "Agricultural Gazette".

Miscellaneous

Interstate Visits.—The Chief of the Division acted as judge of the Dairy Cattle Sections of the Brisbane Royal Exhibition, Adelaide Royal, Melbourne Royal and Davenport (Tasmania) Shows. He also attended the Dairy Officers' Conference at Adelaide arranged by the Department of Primary Industry to discuss Dairy Industry Extension Grant matters, and the meeting of the Dairy Production Sub-Committee (Animal Production Committee).

Country Agricultural Societies Shows.—Officers of the Division attended fifty country shows and acted as judges and stewards in dairy cattle and dairy produce sections.

DIVISION OF SCIENCE SERVICES

Biological Branch

PLANT PATHOLOGY SECTION

NEW PLANT DISEASES

Fifty-seven new diseases were recorded, most of which were of minor importance, or concerned additional hosts of old pathogens. After a wet spring, conditions were dry for most of the year and losses from plant diseases, generally, were light—particularly in fruit which yielded fine crops. There were heavy losses of peach, citrus and apricot trees throughout spring, following flood rains the previous autumn and winter.

CEREAL DISEASES

Wheat Diseases.—In all parts of the wheat belt rain was well above average; in most parts of the centre and south, it was almost double the annual average. As a result, only about half the intended acreage could be sown. Frost damage was not extensive, however, owing to the mild conditions, except where crops were sown too early. Hail damage was unusually light, the loss estimated at approximately 0.66 per cent. of the total yield, 28 million bushels.

In contrast to the beginning of the season, very little rain fell on the wheat belt in November and December. Rusts (*Puccinia graminis tritici* and *P. triticea*) caused relatively little damage, but the wet soil favoured foot rot (*Helminthosporium sativum* and other fungi) and take-all (*Ophiobolus graminis*); these were the most serious wheat diseases in 1956, causing occasional losses of up to 75 per cent.

Bunt (*Tilletia foetida* and *T. caries*) was seen in only three crops and in one delivery to the Australian Wheat Board, but the prevalence of loose smut (*Ustilago tritici*) seems to be increasing. Seed from the Department's pure seed scheme was notably free from loose smut.

The first recorded occurrence in N.S.W. of eyespot (*Cercospora herpotrichoides*) was in hybrid winter wheat lines at the Agricultural Research Institute, Wagga; later it was found quite widespread in the region.

Maize Diseases.—The maize season was dry in most districts. Cob and stem rots were much less common, but frost injury was more evident than usual—first, on the tablelands where late frosts damaged seedlings soon after emergence; second, in autumn in the Tumut district where April frosts damaged the crop before it was mature.

Rust (*Puccinia sorghi*) was quite severe in parts of the central and north coast, spore production in some cases being suppressed by *Darluca filum*.

The Bathurst district was surveyed for boil smut (*Ustilago zeae*) in March but no trace was found. The disease has not been recorded for seventeen years but, owing to its previous reappearance at Bathurst, after sixteen years during which it was not recorded, it is still too soon to know whether the fungus has been eradicated.



Golden Tares at Tabulam

Sod-seeding golden tares into native pasture stands is becoming a popular addition to winter grazing programmes.

Departmental biologists are investigating cases of root-rot and stem-blackening in north coast pastures containing golden tares.

(Photo. from Division of Science Services—Biological Branch).

DISEASES OF PASTURE PLANTS

Now that pasture plants have come under closer scrutiny, new diseases continue to be recorded every year.

Clover Diseases.—No serious outbreaks of scorch (*Kabatiella caulivora*) were reported this year, but it was recorded on an additional host, berseem clover (*Trifolium alexandrinum*), for the first time in N.S.W. Two minor diseases of subterranean clover (*T. subterraneum*), stem gall (*Physoderma rifolii*) and leaf and petiole gall (*Synchytrium aureum*) were also recorded from the south-west, and *Cercospora zebrina* was recorded causing a leaf spot of hare's-foot clover (*T. vavilovense*). The little-leaf and stunting virus disease of subterranean clover was much less troublesome than in previous seasons.

The failure of red clover to persist for more than a season or two in coastal areas remains a problem. The plants usually die of ill-defined crown rots. Root knot (*Meloidogyne* sp.) was again observed in this area and may be more important than at present recognised.

Lucerne Diseases.—No serious diseases of lucerne were reported during the year. A general unthriftness has been observed during the last few years in the Taree district, but field inspections did not suggest this was a problem of plant pathology. Nutritional and nodulation difficulties seem to be the cause.

Cowpea Diseases.—This crop is becoming more important, both in pure stands and sod-sown, for summer feed on the north and central coasts. The most popular variety, Poona, is very susceptible to a stem rot caused by a species of *Phytophthora*, and this disease threatens to limit the use of cowpeas in this region unless resistant varieties are introduced. The variety Cristaudo, which has some resistance, has also succumbed.

Golden Tares (*Vicia sativa*).—This plant is also becoming popular for sod-seeding, for production of winter feed. However, a root rot (*Sclerotium rolfsii* and an unidentified fungus) caused a severe root rot in an area at Raleigh and an as-yet-unidentified stem-blackening occurred at Kyogle. These diseases are being investigated.

DISEASES OF VEGETABLES

Late Blight of Potato (*Phytophthora infestans*).—In contrast to the 1955-56 season, this disease was not significant, owing to the dry season.

In co-operation with the Division of Plant Industry and New England Experiment Farm, testing of seedlings for resistance to the "O" race of late blight is being continued. Using a composite inoculum of late blight isolates collected from coastal and tableland areas, a number of the seedlings submitted for testing last year have shown themselves immune to this race of the pathogen. These include the following seedling numbers: S9535 and S9719 (63-3 x Cortland), S9903 (Pontiac x Kathadin x Cortland), S10214, S10312 and S10021 (835a (4) x 11-79), S9665 (19162 x Adina) and S10305 (835a (4) x Adina). The resistant parents in these crosses were the American variety Cortland, the Scottish seedling 835a (4) and the German seedling 19162. Some of these immune seedlings are showing promise in preliminary yield trials.

During the year a number of seedlings were obtained from the Scottish Plant Breeding Station. These contain individual genes which confer immunity to a number of different races of the potato late blight fungus. These importations enabled completion of a set of differentials which can be utilised to determine the identity of any race of this organism.

Purple-top Wilt of Potato (*Tomato Big Bud Virus*).—For the first time since 1951-52 infections of this disease were recorded in almost all potato-growing districts. The very dry season, as in 1951-52, had encouraged viruliferous leaf hoppers to migrate from their preferred hosts into potato crops.

In coastal spring crops, up to 70 per cent. infection occurred at Pitt Town, and 5 to 10 per cent. infections were recorded in some other crops in the metropolitan area. Maximum infection elsewhere in the metropolitan area and in other coastal crops was 3 to 5 per cent. There were severe infections also in crops at Dubbo and Wellington.

Continued dry conditions on the tablelands resulted in higher-than-usual infections in the maincrop. Up to 12 per cent. infection was present in crops on the northern tablelands (average 2 to 3 per cent.). On the central tablelands maximum purple-top wilt incidence was 10 per cent. (average 2 to 3 per cent.). The disease was of minor importance on the southern tablelands.



Clean Vegetable Seed

1956-57 was the 14th successive year of the Department's Bean Seed Certification Scheme, which has done so much to ensure supplies of disease-free seed for N.S.W. vegetable growers. Certified seed crops of Brown Beauty this year, from the south coast alone, yielded a total of 3,665 bushels.

(Photo. from Western Region).

Potato Leaf Roll (Virus).—Records of certification inspections of tableland potato crops by the Division of Plant Industry have shown that, for the second successive season, no potato crop submitted for certification was rejected for excess leaf roll content. This indicates the continued high freedom from leaf roll in certified seed stocks in this State.

Common Scab of Potato (*Actinomyces scabies*).—Work continued in co-operation with New England Experiment Farm on the project for development of scab-resistant potato varieties. Isolates of the organism have been tested for pathogenicity and will be used by the potato breeder in mass inoculations of seedlings from known scab-resistant parents. One such parent is the American variety Ontario, which was recommended for use in the scab-resistance project after trials in the central tablelands. Ontario continued to maintain high resistance to common scab on the central tablelands during the past season when other varieties showed moderate to severe infection.

Bean Seed Certification Scheme.—The Bean Seed Certification Scheme continued for the 14th successive season. On the south coast, 114 crops were certified for a total estimated yield of 5,826 bushels, made up of 3,665 bushels of Brown Beauty, 850 bushels of Hawkesbury Wonder and smaller quantities of other varieties. Small quantities of seed were also certified at Wellington and Tenterfield.

The main cause of rejection of crops for certification this year was anthracnose. Nine crops were rejected for this disease, three for halo blight.

Bean Anthracnose (*Colletotrichum lindemuthianum*).—Work on production of a bean variety resistant to all races of anthracnose known in New South Wales is continuing with the co-operation of Emeritus Professor W. L. Waterhouse. This year some 1,300 plants, representing 178 different cross-bred lines, were tested for resistance to the two anthracnose races, AUST. 6 and AUST. 8. Many of the lines showed good resistance to AUST. 6, very few to AUST. 8, and only two showed the dual resistance. These were an F4 and an F5 line of the cross Hawkesbury Wonder x Westralia. These lines will be tested in the next generation next year.

Many seed lines of other varieties were also tested during the year and, as in the case of Brown Beauty, different lines of the same variety varied in their reaction to a given race

of anthracnose. Selections from the variety Staley's Surprise (normally susceptible to AUST. 6) which are resistant to this race, are being grown on for test in future generations.

Fungus Wilts of Tomatoes.—Co-operation continued with the Division of Plant Industry in a breeding programme for production of varieties of tomato resistant to fusarium wilt (*Fusarium oxysporum* f. *lycopersici*) and verticillium wilt (*Verticillium dahliae*). Cultures of pathogenic strains of both organisms were prepared and supplied as required.

Virus Diseases of Tomatoes.—Yellow top disease was less prevalent than for some years. In an experiment to test the efficiency of several insecticides in controlling the disease, diazinon gave results significantly better than malathion, lindane and D.D.T.

Observations on the virus causing drop head wilt have established that the virus retains its inherent ability to induce internal root necrosis throughout a series of transmissions under conditions which inhibit development of the necrosis. This helps explain the carry-over of drop head wilt from season to season.

Beet Eelworm (*Heterodera schachtii*).—Beet eelworm disease has not been recorded since the 1953 outbreak at Milperra in the Sydney metropolitan area. A survey showed there had been a slight spread of viable cysts of the parasite on the infested property, and appropriate recommendations were made on cultural, rotational and sanitational measures to keep population of these cysts low.

Club Root of Cauliflower (*Plasmodiophora brassicae*).—Experiment work on the control of this disease in commercial cauliflower crops is being continued. Various fungicides, including inorganic mercurials and chlorinated nitrobenzenes, are being compared for use as slurries into which seedling roots are dipped before planting out into infested soil.

Broad Bean Wilt Virus.—This disease has not been as destructive as in previous years, possibly due to the unusually warm autumn. Work on the virus host range and the possible relationship of this disease to other described virus diseases is being continued.

CITRUS DISEASES

Scalybutt (Virus).—Observations are continuing on experimental trees planted at Griffith and Yanco. In order to obtain scalybutt-free stock of a number of citrus varieties of which no representatives on trifoliata root stock are known in New South Wales, buds have been selected from good types of trees on rough lemon stock for trial on trifoliata.

A possible method of freeing budwood of a desirable variety from scalybutt virus is suggested by an observation in a Murray River orchard. A locally-esteemed strain of Valencia, derived from a tree on rough lemon stock, when worked on to trifoliata developed scalybutt at an early age. However, buds from a vigorous watershoot produced by the parent tree, when worked on to trifoliata, have produced very vigorous virus-free trees, now eight years old. The most probable explanation of this is that the very fast growth of the watershoot outdistanced the spread of the virus into it, and at time of taking the buds the virus had not yet established itself in the new growth. A number of grafts have been made from the tips of young, very vigorous shoots to test whether this might be a method of freeing from scalybutt such varieties as Clementine mandarin, Shamouti orange and some lemon varieties of which no virus-free stock is known.

Tristeza-Stem Pitting Complex.—Observations are continuing on experimental trees planted at Somersby and Yanco. To date bud lines are maintaining the symptom type of parent trees. Anatomical investigation of the changes caused by stem pitting, and tristeza virus in phloem and xylem of a number of citrus varieties and combinations, is in progress with a view to elucidating the relationships of this virus and xyloporosis.

Psorosis-type Viruses.—In course of surveys of orchards in the Murray River area, one block of about 4 acres of 40-year-old Thompson navel oranges was found totally infected. Most were well-grown, reasonably vigorous trees. Only twenty-five had started to decline with scalybark symptoms. It is now thought that the catalogue of psorosis-affected trees in N.S.W. is reasonably complete.

Lemon Crinkle (Virus).—There have been no further records of this disease. Heat therapy of infected seedlings was commenced.

Decline of Sweet Orange on Rough Lemon Stock.—A further range of seedling citrus varieties was tested, but none has yet been found of any value as an indicator. Selections of orange and mandarin varieties affected with decline were worked on to healthy young trees of known parentage on rough lemon stocks. These will be examined at intervals for symptom development.

Mandarin Brown Spot.—Spray trials continued at Pitt Town. No evaluation of the sprays used was possible as very little brown spot developed. A petal-fall application of 0.1 per cent. P.M.C., included in the fungicide tests, caused a heavy leaf and blossom fall. Subsequently, strong new growth was made, some of which showed slight infection with brown spot. Trial potash applications are being continued in association with the spray trials. Zinc deficiency symptoms were rather general in trees of the experiment block. This was completely controlled in the Zineb-sprayed sections. Three applications of Zineb were made at the rate of 1 lb./40 gallons.

Root Rot.—Losses of affected trees have continued throughout the year in coastal and M.I.A. orchards. The very dry conditions have accelerated decline of partly-affected trees, and because of the rather mild summer collar rots initiated in late autumn, 1956, continued activity throughout summer. Total losses up to end of October, 1956, are as follows: Murrumbidgee Irrigation Area, 270 acres; central coast, 2,625 acres; Cumberland area, 80 acres; Orangeville and neighbouring areas, 80 acres; western section, 7 acres; lower Murray River section, 50 acres; total, 3,832 acres. Some of these trees had been in poor condition after earlier wet years.

A series of mandarin and orange selections is under trial for reaction to *Phytophthora* attack under glasshouse conditions.

Sudden Death.—Roots of 6-year-old trees of trifoliata, Seville orange, sweet orange, mandarin varieties, rough lemon and some trifoliata hybrids were inoculated with two isolates of a wood-rotting basidiomycete, at Narara. No results have been obtained yet. Further records of sudden death were received from Leeton and the Wyong area.

Yellows.—In co-operation with the Division of Horticulture, a fertiliser trial has been commenced at Coomealla Research Station. No records of occurrence of yellows have been received this season.

Eradicant Sprays.—Phenyl mercury chloride at 0.1 per cent. was applied to Washington navel oranges at Narara Citrus Research Station. There was complete defoliation and some

twig die-back of the Washington navel oranges, but *Guignardia citricarpa* and *Colletotrichum gloeosporioides* were not eradicated from the foliage. New growth after light pruning has been very good and observations on melanose development will be made. Lemon trees showed a partial leaf-fall and very little die-back. Lower concentrations of P.M.C. will be tried.

Boron Toxicity.—This was found the cause of serious leaf-fall and some decline in tree health in an orchard at Koraleigh. The most severely affected trees were grapefruit and rough lemon stocks, but oranges and lemons also showed symptoms. Boron toxicity was also found the cause of very heavy defoliation of trees in an orchard at Baulkham Hills where a thick mulch of sawdust had been applied some months previously. Sodium borate is used as a treatment of some softwood timbers against powder post beetle, and it is evident that some contaminated sawdust was used in this case.

Septoria Spot.—The unusually wet autumn of 1956 favoured infection, and considerable *Septoria* spot developed in Murray River settlements where normally it is not seen. Grapefruit, Valencia oranges and second-crop lemons at Koraleigh, Barmham, Tocumwal and Barooga were affected, the lesions being somewhat more superficial and later in development than usual in the Murrumbidgee Irrigation Area. A *Mycosphaerella* was found very abundant on fallen lemon leaves at Barooga and on orange leaves at Leeton. This is suspected to be the perfect stage of *Septoria depressa*. Cultures have been made, and Valencia and Washington navel oranges, bagged in early March, were inoculated to establish the relationship.

Corynespora Leafspot.—In 1951 citrus seedlings raised for experiment purposes in the Biological Branch glasshouses were attacked by a leafspotting fungus of the genus *Corynespora*. This caused considerable losses in the following few years but appears now to have been eradicated. No *Corynespora* species parasitic on citrus has been recorded elsewhere. It was sent to the Commonwealth Mycological Institute for identification and has now been described under the name *Corynespora citricola* by H. B. Ellis in C.M.I. Mycological Paper 65. A close watch has been kept for the disease in citrus nurseries around Sydney, but it has not been seen, and the origin of the glasshouse outbreak is impossible to trace.

DISEASES OF DECIDUOUS FRUITS

Black Spot of Apple (*Venturia inaequalis*).—Infection conditions were very favourable during the period of peak maturity of perithecia (October) and until the end of November. However, primary infection was generally well controlled, especially where the improved spraying schedule recommended by the Department was followed. In most districts the season was dry after November and control of secondary infection was not difficult.

For the ninth successive year the peak of maturity of perithecia was found to occur through the blossoming period, about mid-October.

A Hirst spore trap was operated in an apple and pear orchard at Batlow. Only small numbers of spores of *V. inaequalis* were trapped here, most of them during October, confirming the results obtained by laboratory methods.

In co-operation with the Division of Horticulture a spray-warning radio service was provided for growers at Batlow. The warnings were based on the spore trap results and the "Mills System" of estimating infection periods.

A long-term experiment, to compare the yield of apple trees sprayed to control black spot, with thiram or lime sulphur, continued at New England Experiment Farm. At the end of the second year, the thiram-sprayed trees have yielded approximately two cases per tree more than the trees sprayed with lime sulphur. The yields this year were 171.5 lb. of apples (623 apples) per tree at an average weight of 0.275 lb. per apple in the lime sulphur plots; the corresponding figures in the thiram plots are 251.6 lb. (860 apples) and 0.293 lb. respectively.

Apple Black Spot Eradication Experiments.—Investigations continued into the use of eradicant treatment before leaf-fall, for control of black spot. Two small isolated orchards at Tumorrana were re-treated in autumn, 1956, with 0.1 per cent. phenyl mercuric chloride. For the second successive season no other fungicidal spray was applied. In one orchard no infected fruit was found, but slight leaf infection was detected on two of its twenty-five trees. In the other orchard there was slight leaf infection on a few trees and a few infected fruit. Both orchards were re-treated with 0.1 per cent. P.M.C. in autumn, 1957.

At Maroota, a well isolated orchard of 220 trees was treated in autumn, 1956, with 0.1 per cent. P.M.C. after treatment the previous autumn with 0.1 per cent. phenyl mercuric

acetate. The only other fungicidal spray applied in this orchard since the end of the 1954-55 season, was one lime sulphur spray in December, 1955. This year no infected fruit was detected. Trees were thoroughly examined and leaf infection and two infected leaves were found late in the season, one showing one small lesion, the other four small lesions. These leaves were collected and the orchard was left untreated in autumn, 1957.

Further investigations were carried out into the effectiveness of various concentrations of phenyl mercuric chloride as autumn eradicants, the field work at Batlow, the laboratory work at Sydney. Some perithecial development was found to occur after spray treatment with concentrations 0.01 per cent., 0.025 per cent., 0.005 per cent. and 0.075 per cent., but at 0.1 per cent. no perithecia developed. The inoculum, at the peak of perithecial maturity in mid-October, was found to have been reduced 95 per cent. by the lowest concentration of P.M.C. used, 0.01 per cent. Treatment at this concentration is cheap and may prove a valuable adjunct to the normal schedule of protective sprays applied for black spot control.

In a further experiment to determine the role of time of leaf-fall in the saprophytic phase of the life cycle of *Venturia inaequalis*, it was found that leaves which fell before early March produced no *Venturia* inoculum, those which fell between early March and early May produced insignificant numbers of spores, and that the bulk of the inoculum in October came from leaves which fell in late May and early June, i.e., the last leaves to fall.

Black Spot Control Demonstration.—In autumn, 1956, all apple and pear trees in the 170-acre Yetholme district were sprayed with phenyl mercuric chloride. In this demonstration, conducted in co-operation with the Division of Horticulture, the results at the end of the first season are encouraging. All growers reported fruit quality better than they have ever produced. Probably the best result was achieved by a grower who applied only three sprays during the season; of 1,100 cases harvested, he found only six apples slightly infected with black spot. All orchards were sprayed again this autumn.

Black Spot of Pears (*Venturia pyrina*).—Black spot this season caused far more damage throughout the State on pears than apples. The time and intensity of ascospore discharges were measured by a Hirst spore trap in an orchard at Batlow. The heaviest discharge (1,919 spores per cubic metre of air) occurred on 16th October, and severe infection resulted from this and other discharges in a continuous 108-hour infection period from 15th to 19th October inclusive. Spore discharge commenced on 19th September and no spore was trapped after 24th November. The daily pattern of spore discharge during rain periods was regular—no spore was trapped at night, increasing numbers were trapped in the morning, reaching a maximum about mid-day, then decreasing through the afternoon.

Powdery Mildew (*Podosphaera leucotricha*) of Apples.—Powdery mildew infection was severe. In an experiment on Jonathan apples at Orange there was no difference in control between Karathane and sulphur; control in each case was moderate only.

Limb Canker (*Botryosphaeria ribis*) of Apples.—In the first dry summer for some years, extensive damage occurred in coastal orchards, especially where trees were not adequately watered. In an orchard at Dural, where a suitable spraying programme was evolved to control the shoot and spur blight phases of this disease, all plots were sprayed and good control was achieved. No limb canker has appeared in this orchard yet.

Virus Diseases of Pome Fruits.—A range of symptoms of which virus infection could be the cause, are still being investigated. These include flat limb of apple, green crinkle of apple, apple "measles", stony pit of pears and ringworm of pears.

Some scions from a Gravenstein apple affected by flat limb were grafted on Jonathan seedlings and subjected to heat therapy. Two trees survived and will be transferred to Bathurst Experiment Farm for further observation.

Brown Rot of Stone Fruits (*Sclerotinia fructicola*).—Brown rot infection, generally, was very slight in all crops, despite heavy blossom infection in some districts, particularly in the Murrumbidgee Irrigation Areas. However, a severe infection occurred in maturing apricots at Koraleigh on the Murray River, under very dry conditions. The evidence suggests that this, the first recorded outbreak at Koraleigh, originated from latent infections during the wet spring. Inoculum may have been introduced to the orchard and become established in the trees, during the wet summer or autumn of the previous season.

An experiment at Leeton tried a new approach to control of brown rot: use of a dormant spraying with phenyl mercuric chloride 0.1 per cent., to suppress sporulation within the trees. This treatment was followed by various schedules through the growing season, using ziram as the fungicide. As no infection occurred in the untreated trees, no information was obtained from this experiment, except to confirm the safety of P.M.C. as a dormant spray on peaches.

In a further experiment at Yanco Experiment Farm, P.M.C. 0.1 per cent. was applied to several Golden Queen trees in late winter. Very slight blossom blight occurred on both sprayed and unsprayed trees, but there was no subsequent development of brown rot.

At Yanco Experiment Farm, the reaction of peach and apricot trees to P.M.C. was investigated twice. P.M.C. at concentrations of 0.01 per cent., 0.005 per cent., 0.0025 per cent. and 0.00125 per cent. was applied to limbs of peach and apricot trees on 9th October (apricots at late shuck-fall, peaches at petal-fall). The peach trees were not damaged; on the apricots some leaf spotting resulted from the two higher concentrations, but was not serious. On 25th October, P.M.C. was applied to peach and apricot trees at 0.005 per cent. and 0.0025 per cent. These sprays caused rather severe leaf spotting.

Brown rot incidence was compared between two sections (each of twenty trees) of a small planting of Wotton peaches in an orchard at Dural. One section received normal cultural and spraying attention, the other received two additional pre-harvest sprays as well as summer pruning and more severe thinning, in an attempt to modify the fruit's environment. Although brown rot infection was very slight for this variety, the results showed a trend in favour of the special treatment—2 per cent. brown rot in the normal treatment section, and 0.85 per cent. in the special treatment section. In the latter section other advantages were apparent—earlier and more uniform maturity, increased size, easier and faster harvesting.

Root Rot (*Phytophthora spp.*).—Root rot caused by *Phytophthora cinnamomi* has destroyed many thousands of peach and apricot trees in coastal districts in recent years. Losses were again heavy after the very wet autumn and winter of 1956. Following flooding at that time in the Murrumbidgee Irrigation Areas, more than 200,000 peach and apricot trees died. Two species of *Phytophthora* isolated from the roots of young trees have been identified at the Commonwealth Mycological Institute, Kew, as *P. megasperma* Drechs. and *P. erythroga* Pethy. The pathogenicity of these isolates to peach will be tested next spring.

Bacterial Canker of Cherries (*Pseudomonas syringae*).—Bacterial canker infection was more severe than in recent seasons. Three experiments were conducted in cherry orchards at Orange involving the use of streptomycin sprays at intervals through autumn and winter. The results indicated that streptomycin nitrate sprays, at the times applied in these experiments, failed to control bacterial canker in cherries.

Cherry Leaf Spot (*Coccomyces hiemalis*).—No further evidence of this disease has been detected since eradication measures were taken in the nurseries in 1950.

Rust of Prunes (*Puccinia pruni-spinosae*).—A further fungicide testing experiment was conducted at Young, but, as no rust occurred in the untreated plots, no result was obtained.

The experiment was continued at Young to determine the effect of fungicides, applied for prune rust control, on yield of prunes. An organic fungicide (zineb) was substituted for the thiram used last season) was compared with lime sulphur and with weak Bordeaux mixture. The plots treated with the organic fungicide again produced the highest yield and the best-quality fruit.

DISEASES OF GRAPE VINES

Downy Mildew (*Plasmopara viticola*).—With the co-operation of officers of the Division of Horticulture, spray trials including copper oxychloride, copper oxide and dithiocarbamate formulations were conducted at Orchard Hills, Griffith and Koraleigh. Extremely dry conditions in all parts of the State during the growing season prevented any disease development.

Moulding (*Botrytis cinerea*).—Trials of preharvest sprays on sultanas at Koraleigh and on muscats at Canley Vale were conducted, but no disease development occurred.

Bunch Stem Die Back.—There were no developments this year.

Black Spot.—The prolonged cool conditions of spring favoured black spot infection, but the disease was well controlled where ziram or thiram was used.

Dead Arm (*Phomopsis viticola*).—Prolonged cool weather in spring 1956 and damp conditions up to mid-November in the Murrumbidgee Irrigation Areas encouraged development of this disease throughout the area and caused losses of fruit by infection of bunch stems. Spur dieback and infection of new canes also occurred. The most susceptible varieties were Palomino and Waltham Cross. Cornichon was moderately susceptible. Varieties showing cane lesions, but not much die back or loss of fruit, were Frontignac, Sultana, Grenache, O'Hanez, Emperor, Valensi, Rutherglen Tokay and White Grenache. The widespread occurrence of this disease under conditions favourable to it indicates that the fungus must be a common inhabitant of dead cane tissue, though it causes little or no disease in ordinary seasons. A spray programme has been arranged for the coming season.

A Virus Decline.—Surveys of vineyards at Corowa, Pokolbin and Rooty Hill indicate that a virus disease closely resembling Pierce's disease is well established and has caused deterioration of an estimated 750 acres of vineyards. It appears that a rather rapid spread may have occurred in the last five to six years but the infection has probably been present, and slowly spreading for many years. Investigation into the disease has commenced.

Black Measles.—Sultana vines in several vineyards at Koraleigh show symptoms closely resembling those of the Californian disease, black measles. This disease, the cause of which has not yet been established, manifests itself as a dark blotching of fruit and a conspicuous foliage mottle.

Flood Injury.—At Curlwaa, Goodnight and Mallee Cliffs on the lower Murray River, several vineyards were submerged for periods of three to five months during the 1956 winter flood. Most of these vines shot normally in the spring. Losses from subsequent salting have been relatively light.

DISEASES OF TROPICAL FRUITS

Bunchy Top of Banana (*Virus*).—Successful control of this disease was maintained by the Bunchy Top Control Campaign. A series of plantations with a bad record of bunchy top outbreaks received a ground spray of dieldrin and a foliage spray of diazinon to observe their influence on vector population and disease incidence. The trial is still in progress.

Leaf Spot (*Cercospora musae*) of Banana.—Defoliation from this disease remains a problem in the industry because of increasing costs of spraying. Trials have been started into the use of oil-based fungicides applied by "Swingfog" and "Micron" type machines, aimed at developing a less costly control method.

DISEASES OF OLIVES

***Cercospora* Fruit Spot (*Cercospora cladosporioides*).**—Following the prolonged wet autumn 1956, this disease occurred in several orchards at Leeton, and at Wagga Experiment Farm, causing losses of up to 95 per cent. of the crop of the susceptible variety Verdale. It had not been seen in these areas previously, but its presence on all trees of the susceptible variety indicates it must have been well established as an inconspicuous leaf infection. Very dry weather in autumn 1957 was not conducive to infection, and a spraying trial planned for control of the disease was not applied.

DISEASES OF ORNAMENTALS

Branch Wilt of Carnations (*Fusarium roseum*).—Is rarely recorded in New South Wales, but during the autumn it caused severe damage to several varieties at North Rocks. The variety Frank Alldritt and other coloured varieties were severely affected, but a white variety was not attacked. Control experiments are being carried out.

***Gladiolus* Corm Diseases.**—Studies continued into the control of corm diseases of *Gladiolus*, the aim being to evaluate different treatments. Both dips and dusts were used as pre-planting and pre-storage treatments. Preliminary results indicate that the standard 1 : 1000 mercuric chloride dip gave control of these diseases as good as any of the other treatments.

Pansy Leaf Spot (*Centospora acerina*).—Was recorded for the first time in New South Wales from Mascot. The fungus causing this disease is of special interest. It has a wide host range, being found on silver beet, wintercress and celery and carrot in storage.

Stem Canker (*Cercospora rosicola*) of Roses.—Was recorded for the first time in New South Wales on multiflora stock seedling selections at Kellyville. Overseas, this fungus causes a leaf spot, and does not appear to have been described as a cause of canker.

The foliar nematode (*Aphelenchoides olesistus*) is becoming more prevalent on ornamentals growing in glasshouses. It has recently been recorded on Cyclamen, African Violet, Kalanchoe and Primula.

MUSHROOM CULTURE

The cultivated mushroom industry in New South Wales has continued to expand, particularly in the Sydney metropolitan area and the near tablelands. Annual value of the product is now about £500,000. Interest by canneries and mushroom soup makers has mainly been responsible for this development.

The increasing shortage of horse manure for compost has made growers more interested in synthetic composts, both the American and English formulae being utilised. Satisfactory yields have been reported in a number of cases with these composts.

Quality of commercial grain spawn continues to be high. Seven producers of spawn are operating at present. Most of the spawn produced is of the white strain, though sales of the brown strain are being made to growers who produce for canners and soup makers.

Instruction in methods of spawn production was given by the Biological Branch to officers of two commercial firms during the year.

BACTERIOLOGY SECTION

Biological examination of dairy products has continued on a larger scale. A co-operative project of butter testing was conducted with the Division of Dairying. Butter samples from 24 of the major butter factories in New South Wales were tested weekly during the main producing months for total, coliform, yeast and mould and casein digester counts. In all, 355 samples were biologically analysed. Of these, 265, or 75 per cent., were deemed of unsatisfactory biological quality. By far the most common defect was an excessive yeast and mould count, and advice on methods of overcoming this form of contamination was given to factory management. A marked improvement in quality was noticeable in the latter period of the survey.

Cheese Starters.—Investigations into the possibility of distributing freeze-dried starter cultures manufactured by the C.S.I.R.O. were satisfactorily completed, and this system of distribution has now been adopted. Lactic acid cultures maintained in sterile skim milk are still distributed to those factories requiring them.

Imported Fancy Cheese.—The increase in the amount of fancy cheeses imported into New South Wales has caused some concern over the possibility of introducing foot and mouth disease on them. It is thought that if the pH of cheese is sufficiently low, the virus will be inactivated. Accordingly, a survey of the acidity of 32 types of imported cheese was undertaken in co-operation with the Division of Animal Industry. Most cheese types were found to fall within pH limits considered safe.

Rennet.—Several cases of "blown" cheese manufactured in New South Wales were biologically examined to determine the cause of the defect. Results indicated that the causal organism may be introduced by the rennet used in manufacture, and a limited survey of the biological condition of this material was undertaken. A similar examination of imported New Zealand cheddar cheese was conducted.

Samples of water, milk and industrial materials such as clay used for pottery making, and lubricating oils, were also biologically examined.

Biological Surveys and Bacteriological Instruction.—Several surveys were conducted on dairy factory premises and individual dairy farms to determine the efficiency of sanitary procedures and the causes of specific defects. Four Dairy Science Schools, run by the Department, were attended by a bacteriologist and instruction was given in general hygiene and dairy bacteriology. A School for Dairy Officers at Hawkesbury College was also attended, where instruction was given in the technique and use of lyophilised starter cultures.

Nitrogen-fixing Bacteria.—As a result of the general unsatisfactory nature of commercial legume inoculants in the 1955-56 season, a conference between officers of the University of Sydney and the Biological Branch was held towards the end of 1956, to institute stricter control measures on the manufacture of these cultures. It was decided to establish a joint advisory service (University-Department of Agriculture Laboratory Service) to provide more comprehensive and direct help to the manufacturers.

The advisory service has undertaken to provide at regular intervals, mother cultures of strains of root-nodule bacteria recommended as inoculants for specific legumes, and to outline the conditions under which these cultures should be maintained by the manufacturers. These mother cultures are regularly checked by the Laboratory Service for effectiveness, virulence, etc. Another function of the advisory service is to provide details of methods whereby the manufacturer can adequately determine the numbers of rhizobia, and freedom from contamination, of the broth cultures prior to mixing with the peat. The Laboratory Service has undertaken to do periodic checks of the broth cultures and to test the quality of samples of each batch of peat culture produced by each manufacturer. This testing includes moisture determinations, plate counts, serological identification of isolates from the plates, and plant tube dilution tests which give a more accurate estimate of the number of rhizobia in the peat than the plate count.

In return for this assistance the manufacturers have agreed to limit the sale of inoculants to the specific legumes for which tested cultures are available. They have also agreed to obtain their mother cultures from the Laboratory Service only, and have agreed to submit five cultures from each batch of peat inoculant prepared. Each batch must be stamped with the appropriate batch number and expiry date for identification purposes. The manufacturers also agreed to provide financial assistance for the Service.

Despite the additional precautions taken following the formation of the University-Department of Agriculture Laboratory Service, some poor-quality cultures have been detected and attempts made to remove these batches from the market. The poor-quality batches appear to coincide with rush periods during the manufacturing season and, as a result, it has been decided that in the coming season the manufacturers should attempt to prepare most of the cultures before the season commences so that each batch can be adequately tested before sale.

A study of the use of bacteriophage, to identify strains of *Rhizobium* in peat cultures, has been started. This method may be simpler than serological typing of isolates.

Field trials of *Rhizobium* strains on subtropical legumes have been carried out with the co-operation of the Division of Plant Industry at Grafton Experiment Farm. All plants of *Phaseolus lathyroides*, *Dolichos bifloris*, *Centrosema pubescens* and *Lespedeza striata*, including those in the uninoculated rows, were effectively nodulated, and no differences were recorded in growth between treatments. Apparently nodulation in all cases was due to indigenous rhizobia effective on all four species. Most plants of *Lespedeza stipulaceae* were ineffectively nodulated in all treatments, indicating that *L. stipulaceae* exhibits a higher degree of specificity than *L. striata*. A significant response in *Pueraria phaseoloides* was obtained with two strains originally isolated from this species, while no response was obtained with two strains from *P. thumbergiana*; possibly indicating some host strain specificity in the genus. Strain trials on a number of clover and medic species at Running Stream did not yield any worthwhile results, as the plants were heavily grazed by kangaroos.

Investigations into the influence of fertiliser treatments on nodulation at Running Stream, in co-operation with the Chemist Branch and the Division of Plant Industry have continued. Inoculated, lime-pelleted seed was shown to give excellent nodulation in this soil when sown in direct contact with acid superphosphate, and appears to be the most economical method of establishing rhizobia in acid soils. However, observations on the nodulation of regenerated plants in the second year indicate that nodulation is poor, due to the restricted spread of the bacteria from the site of initial nodulation on very acid soils (pH 4.8). Topdressing treatments have been superimposed on these plots in an effort to overcome this effect. In more favourable soils in N.S.W., nodulation of regenerated plants appears to be quite satisfactory. Ammoniated superphosphate was also used in an effort to overcome the acidity of superphosphate, but nodulation counts revealed that nodulation was no better than the acid superphosphate controls.

A study of the premixing time required for 50/50 carbonate of lime and superphosphate was made at Running Stream. Nodulation was significantly depressed where the lime and superphosphate mixture was used immediately or one day

after mixing, while nodulation was excellent where the inoculated seed was sown with 50/50 lime superphosphate premixed a week or more before use.

Bee Diseases.—Of twenty-four samples of adult bees and brood submitted by the Apiary Branch, nine infections by *Nosema* were found, one of American Foul Brood and one of European Foul Brood. The Bacteriology Section is also co-operating with the Apiary Branch in an investigation into the control of *Nosema apis*, using the antibiotic Fumadil B.

Entomological Branch

GENERAL

After a wet winter the dry weather throughout the rest of the year did not favour fruit fly infestations in most districts, but was favourable to development of red spider on fruit and vegetable crops throughout the State. Neither plague locust nor black beetle activity caused much trouble—and pasture caterpillars and cutworms were not recorded in plague numbers in areas normally subject to river flooding.

FRUIT PESTS

Citrus Red Scale (*Aonidiella aurantii*).—Dry conditions favoured development of red scale during autumn, but were also very suitable for application of control measures in inland citrus districts. Spraying has largely superseded fumigation, and many growers are adopting a two-spray schedule. This control method has become more acceptable practice since the demonstration that Malathion, combined with half-strength oil-sprays, allows a reduction in the total amount of oil-spray applied to the trees in one season, with a consequent reduction of injury to trees and fruit. Parathion has not been found satisfactory for red scale control, owing to the high hazard to operators and to the tendency of this material to increase soft brown scale infestation. Diazinon and Chlorthion do not offer promise for red scale control, and Trithion does not appear to be outstanding.

White Wax Scale (*Ceroplastes destructor*).—Cool weather in late spring and early summer delayed hatching of white wax scales for at least two weeks in most areas, and spray timings had to be adjusted. Well-timed and applied oil sprays gave good results, but many growers could not spray at the correct time owing to trees in unirrigated orchards suffering from drought.

The new organo-phosphorus insecticide Trithion was tested against white wax scale in the young stages but results were not impressive.

White Louse Scale (*Unaspis citri*).—Use of colloidal or dispersible sulphur, combined with routine Bordeaux mixture sprays, applied for fungus disease control, has been widely accepted by coastal citrus growers for control of white louse scale. This method has largely replaced winter spraying with lime-sulphur for this purpose.

Light-brown Apple Moth (*Tortrix postvittana*).—Very severe infestations of this pest occurred on citrus trees in the Murrumbidgee Irrigation Area during spring, causing much foliage damage in some orchards. Newly set fruit was also severely scarred. Growers who used TDE to control this pest obtained satisfactory results. Parathion gave a good kill of larvae but Malathion and Trithion were ineffective. Light-brown apple moth was less troublesome in stone and pome fruits than usual during summer and autumn, though some districts suffered. Diazinon gave very good control when applied as a routine spray to apples.

Citrus Gall Wasp (*Eurytoma fellis*).—Wasps emerged from galls on citrus trees in the Metropolitan Area considerably later than usual. The pest has extended further to various parts of the Sydney area, and was recorded at North Ryde and Canley Vale. Commercial citrus-growing districts are still free from gall wasp and infestations in the Hawkesbury River area seem to have been eliminated.

Fuller's Rose Weevil (*Pantomorus godmani*).—These weevils became very abundant and troublesome in coastal orchards during autumn and damaged citrus, apple and peach trees and many vines and shrubs. Satisfactory results were obtained by spraying with DDT or Dieldrin; but Dieldrin is preferred, as it does not promote an increase in scale and mite pests.

Mealybugs (*Pseudococcus* spp.).—Seasonal conditions favoured mealybug development, and infestations were common on citrus, grape vines and many garden plants. On navel oranges, mealybugs were common in the navel cavity, and their feeding activity in these sites caused some fermentation and breakdown. This attracted the secondary Island fly (*Rioxa*

porina) which oviposited in the area, and maggot development brought rapid fruit fall and breakdown. Mealybugs occurred in large numbers on sultana vines in Lower Murray vineyards and caused growers considerable concern. Some small-scale trials indicated that a 5 per cent. malathion dust gave very good control, and dusted vines were not reinfested.

Brown Scales (*Saissetia oleae* and *Coccus hesperidum*).—There were heavy infestations of these scales in some coastal and inland orchards. Where parathion spraying has been adopted for control of red scale, heavy infestations of soft brown scale frequently follow, with excessive production of honeydew and consequent sooty mould. Preliminary experiments indicated that ant control by ground application of dieldrin sprays may provide good supplementary control of brown scales.

European Red Mite (*Paratetranychus pilosus*).—A single infestation of this pest was discovered at Orange in 1954 but this apparently succumbed to treatment. During the year, a widespread infestation was located at Tenterfield, and more recently small, scattered infestations have been seen in the Orange district. This pest may be present over a wider section of New South Wales than was thought. European Red Mite is also known to be present in the Stanthorpe district of Queensland, a short distance from the Tenterfield area.

Queensland Fruit Fly (*Dacus tryoni*).—Fruit fly infestations in most districts were lighter than for many years past, and many home gardeners in the Sydney area were able to harvest clean fruit and tomatoes without control treatment of any kind. Market reports and horticultural officers' statements reflected this general trend in almost all areas during the main part of the season. Increased numbers of flies appeared in autumn and there was some stinging of early citrus varieties. It was surprising, therefore, that a heavy infestation of Queensland Fruit Fly occurred at Corowa on the Murray River, and another heavy, though limited, infestation at Hillston. No evidence of fruit fly was seen in the M.I.A. A small infestation was discovered at Mildura and this, together with the Corowa infestation and a small occurrence at Ganmain, caused a restriction on export to New Zealand of citrus fruits from the Upper and Lower Murray districts and from the Leeton end of the M.I.A.

These events confirmed the urgency of providing a satisfactory commodity treatment for citrus fruits. This is being developed as a combined C.S.I.R.O.-Department of Agriculture project at the Citrus Wastage Research Laboratory, Gosford. The special fly-breeding unit was completed, and techniques of breeding were perfected during the season. Ethylene dibromide fumigation is now being investigated under standard conditions. Substitution of a special dehydrated carrot medium for the banana medium previously used for maggot rearing greatly improved the yield of strong healthy flies and the consequent production of large numbers of eggs. Earlier work with low-temperature storage of citrus fruit for fourteen days at 31 degrees Fahrenheit showed that this procedure was sufficiently effective to be accepted as a condition of entry by the New Zealand authorities. Advantage has been taken of the process to facilitate the marketing of M.I.A. citrus in Victoria.

Tests with the male attractant lure, anisyl acetone, provided by the United States Department of Agriculture, Hawaii, showed this material capable of attracting male flies over some distance away from orchard trees. It is expected to be useful for survey work.

In caged tree tests with apples, further good evidence was found for use of a bait containing 0.15 per cent. malathion, 0.2 per cent. protein hydrolysate of yeast and 2.5 per cent. sugar, as a weekly application. The overall practical advantage of this treatment over the standard tartar emetic-sugar bait is slight, and is not expected to be statistically significant. Inconclusive results were obtained in a trial in which attempt was made to protect an area of about an acre of apples, using a standard tartar emetic-sugar bait applied over 2 to 3 acres through a micron sprayer. Although comparison with a similar untreated block shows satisfactory results, stinging was not completely prevented. Good control of fly was obtained where Narrabeen plums were sprayed, a fortnight before picking, with L.13/59 at 0.125 per cent. and at weekly intervals thereafter with this material at 0.0625 per cent. Egg insertion tests with apples which had received a programme of sprays of L.13/59 showed that complete protection was obtained for about a month after the third spray.

Woolly Aphid (*Erisoma lanigerum*).—This pest generally caused little concern where green tip applications of BHC or lindane were thoroughly applied. Where this was not done, some severe infestations developed. Experimental applications of lindane combined with Bordeaux mixture, or lindane-superior oil, BHC miscible oil, or endrin, in combination with lime-sulphur, all gave satisfactory results when applied at green tip stage. Growing season infestations were well controlled by metasystox applied in February.

Red Spider (*Tetranychus telarius*).—Dry summer and autumn weather provided ideal conditions for development of red spider in all districts, and pome and stone fruits were heavily infested. In some instances light infestations of spider were observed in citrus trees close to other infested hosts. Spectacular reductions in red spider populations were observed in many districts as a result of attack by the Coccinellid predator, *Stethorus vagans*. High populations of spider occurred on bananas on the North Coast and caused considerable russetting of mature fruits.

Single applications of metasystox, aramite or aramite plus ovex, kelthane, and tedion, gave very good results against spider in experiments at Orange. P.C.P.B.S. gave poor control. Chlorobenzilate gave a quick kill, but reinfestation was fairly rapid and some injury to apple foliage occurred.

Codling Moth (*Cydia pomonella*).—Weather conditions during summer favoured development of codling moth, and this pest was more prevalent than for some years. Where recommended control measures were properly carried out, this pest gave little trouble, but there were heavy infestations in unsprayed or poorly sprayed orchards. Experimental fortnightly application of diazinon gave excellent control and, in addition, controlled red spider and light-brown apple moth. A proprietary synergised mixture of DDT and lindane applied at three-week intervals gave good control of codling moth but indifferent control of light-brown apple moth.

In the M.I.A., supervised grower application of malathion at two and a half week intervals, on an orchard basis, gave excellent control of codling moth on a number of pear blocks, also a few apple blocks. In addition, very good control of red spider was achieved and there was little trouble from light-brown apple moth.

Red Mite (*Bryobia praeliosa*).—Applications of lime-sulphur 1:20 plus superior oil 1/100, to which BHC miscible oil was added for woolly aphid control, gave complete mortality in eggs when applied at green tip stage on apple. Where superior oil 1/50 was combined with Bordeaux mixture 1:1:10 plus BHC miscible oil, the results were less effective.

Black Cherry Aphid (*Myzus cerasi*).—Very satisfactory control of this pest was achieved by the use of tar distillate in July; DDT in superior oil, or DDT-thiocyanate, at mid-bud-swell; or endrin in superior oil, lindane in superior oil, or diazinon, at bud-burst.

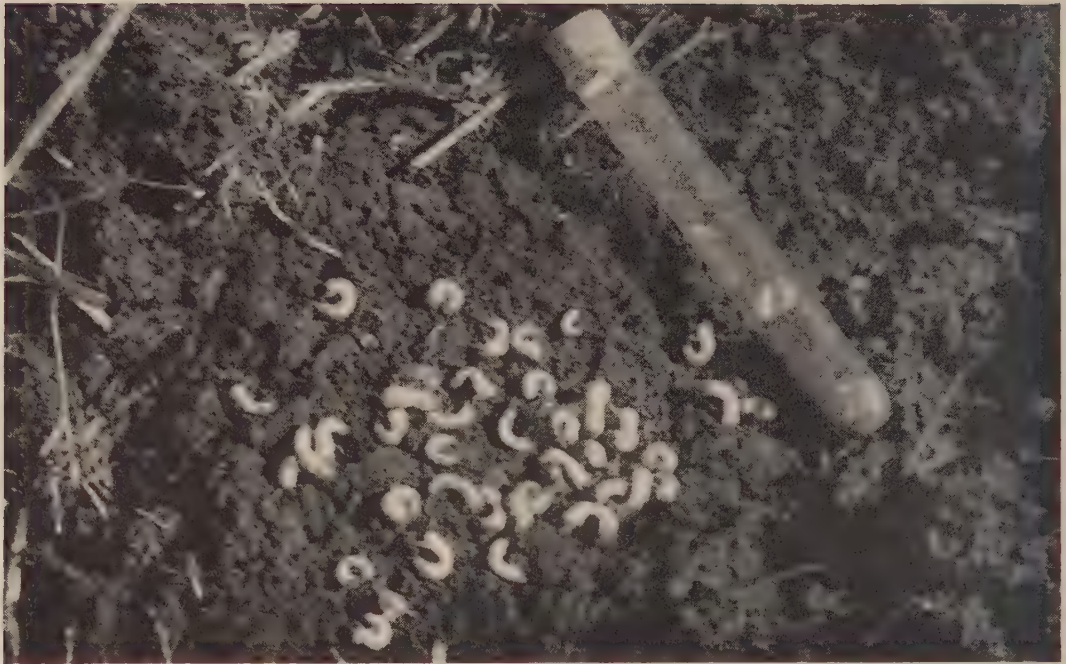
Banana Beetle Borer (*Cosmopolites sordidus*).—Drought conditions favoured infestation by banana beetle borer in untreated plantations, and severe damage was recorded. Recently developed recommendations were applied in most plantations and this pest received its greatest setback in the history of banana growing in this State. Further experimental findings indicate that:—

- Low-volume dieldrin ground sprays give results equally as good as high-volume sprays, at the general application rate of 8 to 10 oz. dieldrin per acre.
- Total ground sprays in dieldrin give as good control as when applied to bases of plants, and suggest the possibility of adding insecticide to routine weed-control spray.
- Dieldrin dust applied to plant bases give very satisfactory results.
- Aldrin sprays at 1 lb. per acre are equal to dieldrin sprays in effectiveness, but diazinon at 1 lb. per acre is less satisfactory.

Bunchy-top Eradication by Control of vector aphid (*Pentalonia nigronervosa*).—Experimental findings have indicated that reduction in numbers of the ant *Pheidole* sp. by use of dieldrin sprays was followed by a marked decrease in aphid numbers, but eradication of the ants did not mean eradication of aphids, and populations recovered after a period. It seems that eradication of bunchy-top by the use of available insecticides has limited prospects of success.

Banana Rust Thrips (*Scirtothrips signipennis*).—Investigations were finalised. Improved recommendations were made available which banana growers generally adopted during the year. Applied at monthly intervals in summer, dieldrin, lindane, and malathion gave protection against fruit blemish, and did not increase red spider infestation. Of these materials, dieldrin is favoured because of its effect on control of banana beetle borer, and improved fruit appearance following its use.

Dust applications with dieldrin, aldrin, lindane, or combinations of DDT and BHC dusts, should be made at fortnightly intervals until the bunches are two months old, the first application being made within two weeks after the bunch emerges.



Threat to Improved Pastures

White curl grubs, a pest of native grasses such as *Danthonia*, have recently turned their attention to improved pastures on heavy soils. Departmental entomologists are working on a study of the life history of this pest, with the object of developing effective control measures.

(Photo. from Division of Science Services—Entomological Branch).



Crops for Pest Control Tests

Field tests are the final proof of the effectiveness of insect pest control measures developed in laboratory studies.

Crops such as this tomato stand at Narara are grown specifically to test pest control programmes, involving promising new insecticides.

(Photo. from Division of Science Services—Entomological Branch).

FIELD CROP INSECTS

Plague Locust (*Chortoicetes terminifera*).—Climatic conditions did not favour formation of swarms in most areas. A small carryover from the 1955 plague was experienced in the Jerilderie, Corowa, and Urana Pastures Protection Districts. Spring hatchings were very late, many egg-beds having been under flood water for months during the previous autumn and winter. The infestation died out after the first generation.

Scattered populations of locusts were present in the Tamworth, Armidale, Dubbo, Coonamble and Coonabarabran districts in March and April. Thin flying swarms also entered the north-west portion of the Coonabarabran district in March from the Walgett district, where they apparently originated. Widespread dry conditions from January to May prevented any larger build-up of locust numbers in these areas, despite the good body of feed present at end of 1956.

In anticipation of a trial locust-control campaign at some suitable time, a patrol officer has been appointed under direction of a committee of management consisting of C.S.I.R.O., Victorian and New South Wales Department of Agriculture representatives. This officer is working in the Bogan-Macquarie outbreak area, making regular assessments of locust abundance in relation to soil and vegetation.

Black Beetle (*Heteronychus sanctae-helenae*).—No damage of any importance by this insect was reported during spring, as the overwintering beetle populations were small. However, with dry conditions through spring, summer and autumn, a build-up of populations can be expected, and emergences of some importance occurred during summer.

A heavy infestation of late-stage larvae occurred in a lawn at Vacluse in March. An experimental application of chlordane at the rate of 6.4 oz. per 1,000 square feet gave unsatisfactory results.

White Fringed Weevil (*Pantomorus leucoloma*).—A melon crop planted at Wiseman's Ferry on land previously under lucerne was attacked in November by larvae of this weevil. Emulsions of 0.05 per cent. dieldrin or parathion, jetted around the plants, caused no plant injury and appeared to provide protection against further damage.

Sorghum Midge (*Contarinia Sorghicola*).—Complaints of poor seed-setting in grain sorghum crops at Gunnedah were investigated. Sorghum midge is believed not to have been responsible; the trouble may have been due to certain weather conditions. Late flowering heads were observed to be injured, but this was not important.

White Curl Grubs (*Othonnius batesii*).—Larvae of this Scarab beetle injured native grasses such as *Danthonia* sp. and *Stipa* sp. on black soils in the Inverell district. In addition, they attacked sown pastures comprising *Phalaris tuberosa*. This damage has occurred previously, but appears to be more evident in recent years. A study of the biology and control of this insect is being initiated.

Clover Weevil (*Amnemos quadrituberculatus*).—Life-history studies have thrown considerable light on the biology of this insect which appears to have a range on the coastal area from the Tweed to the Hunter Rivers. Experimental work has been initiated to test the effect of a range of likely insecticides on established clover pastures, and pastures being established. This work is part of a comprehensive project on north coast pasture establishment by a joint University of Sydney-Department of Agriculture Pasture Research team.

Bloodworms (*Chironomidae*).—Larvae of a Chironomid fly occurred in huge numbers in the mud in rice bays in the Murrumbidgee Irrigation Area in November, and appeared to be associated with poor seedlings growth of rice crops. The area affected was considerable and in some instances large areas had to be resown. In one instance resowing was done from an aeroplane with sprouted seed which had been treated with dieldrin at the rate of 1 ounce active material per 100 lb. of seed. A very good stand of rice resulted and no further trouble from bloodworms was experienced. These insects have occurred in rice crops and drainage ditches in the Murrumbidgee Irrigation Area for many years past but have usually caused little trouble. It is thought that the late cold season, together with the presence of large quantities of organic matter in the soil, resulting from heavy growth of pasture or weeds prior to preparation of the land for planting, was responsible for the great number of larvae present this season.

VEGETABLE PESTS

Seedling Maggot (*Hylemyia* spp.).—Severe infestations of Anthomyid larvae occurred in cabbage and onion crops during early winter in the Metropolitan and M.I. Areas. These infestations occurred in the absence of organic manures or fertilisers of any kind.

Tomato insects (*Heliothis armigera* and *Vasates Lycopersici*).—Experiments at Gosford to test a number of insecticides and fungicides in different combinations showed no significant results, owing to lack of sufficient infestation.

Cabbage White Butterfly (*Pieris rapae*).—Top sprays of endrin or diazinon gave very satisfactory results in tests on cauliflowers at Gosford. A combination of DDT and malathion was also promising. In these experiments, these sprays were superior to standard DDT sprays.

Weekly applications of 0.1 per cent. methoxychlor gave complete control of the pest on cauliflowers at Murwillumbah, and this material was observed to be lethal to full-grown caterpillars.

French Bean Fly (*Agromyza phaseoli*).—Routine sprays of diazinon or dieldrin gave good results against a light infestation of bean fly in French beans, but parathion or malathion was less effective.

ANIMAL ECTOPARASITES

Sheep Blowfly (*Lucilia cuprina*).—In a semi-field trial, in which the technique of artificial implantation of maggots represented blowfly strike, aldrin 0.05 per cent. and dieldrin 0.025 per cent. protected sheep for eighteen weeks. Diazinon 0.025 per cent. was still effective at thirty-three weeks.

Bio-assay tests with adult sheep blowflies are being undertaken with the object of developing a strain of flies resistant to dieldrin. A median lethal concentration has been determined for normal flies, but parasites delayed the program of selection for resistance.

Cattle Ticks (*Boophilus microplus* and *Haemaphysalis bispinosa*).—A semi-engorged *Boophilus* tick was taken from a beast at a Lynch's Creek property in June, several weeks after cessation of fortnightly dipping for eradication. Approximately 600 samples of *Haemaphysalis* ticks were identified during the year.

Paralysis Ticks (*Ixodes holocyclus*).—There were many enquiries during summer from persons suffering from these ticks. The nymphal grass tick forms were troublesome right up to mid-winter in some areas. A paralysis tick was found in October on a sheep at Armidale.

Biting Stable Flies (*Stomoxys calcitrans*).—These were present in plague numbers in the Camden area early in the year, and disturbed dairy cows there.

DOMESTIC INSECTS

Houseflies (*Musca domestica*).—Diazinon sugar bait was successful in reducing adult fly numbers at a tip at Strathfield, though there was a delay of several hours between initial scattering of the bait and marked diminution in fly numbers.

In an attempt to control larvae in the nightsoil depot at Warringah, diazinon gave a marked reduction in numbers. BHC emulsion, also tested by addition to the contents of the pans, gave unsatisfactory results. Fogging with BHC reduced adult fly numbers.

Cockroaches (*Periplaneta americana*).—Satisfactory control of cockroaches was obtained in a garbage dump at Croydon by spraying with 0.5 per cent. dieldrin. The 5-acre area was grid-sprayed 5 feet apart in the most heavily-infested portions, and 10 feet apart in the remainder.

Argentine Ant (*Iridomyrmex humilis*).—Though large numbers of specimens of ants were submitted for identification during the year, the numbers were much smaller than during the previous year. This was due, partly, to the less-active publicity campaign—but, probably, largely to the dry weather during the warmer months, compared with the previous season, when frequent rains drove ants inside buildings, making the pests immediately evident.

Twenty-eight new areas of infestation were discovered during the year, bringing the total known areas of infestation up to about 2,800 acres. Thirty-nine areas were sprayed, and spraying was completed in three areas which had been part-sprayed the previous year. These totalled 586 acres, on which 52,942 gallons of 0.75 per cent. dieldrin spray were applied. In addition, 5.8 acres were "spot-sprayed" at Zetland. The check survey was carried out during February-March; 95 areas were surveyed, totalling 2,131 acres and including 8,070 properties. Eighty-two areas were apparently free of Argentine ants whilst 94 properties totalling some 15 acres had some ants. No ants

have been found on the original experimental area at Platform-st., Lidcombe, or at Blakehurst and Alexandria, where spraying was carried out before 1952. The total area sprayed since the campaign began is 2,686 acres, and the total amount of spray concentrate (chlordane and dieldrin) used is 19,931 gallons. Cost of the campaign to 30th June, 1956, was £46,832, and from that date to 30th April, 1957, £11,557 13s. 5d., making a total cost since the inception of £58,389 13s. 5d.

FIMBER INSECTS

Termites (Coptotermes acinaciformis and Nasutitermes exitiosus).—Inspections and treatment of termite-infested houses in Sydney confirmed the effectiveness of arsenical dust treatments. Control can be assured by treatment of the main connecting galleries generally located on the foundation walls. Many infestations occur by way of earth-filled porches, patios, bathroom floors, etc., where gallery systems are inaccessible. This together with the very variable nature of the arsenic dusts available, is the main cause of failure with dust treatments.

Experimental treatments of foundations with aldrin or dieldrin emulsions have shown considerable promise.

Much assistance has been given to managers of departmental establishments in detection, control and prevention of termite infestations.

Wood Borers (Anobium punctatum).—About 80 per cent. of enquiries re wood borers from the Metropolitan Area concerned old houses, furniture and softwood timbers. In one instance *A. punctatum* attacked a section of spotted gum joist in an old home.

STORED PRODUCT PESTS

Wheat Weevils (Calandra oryzae and Rhizopertha dominica).—An experimental fumigation of oats stored in 2,000-bushel galvanised iron silos, at Cowra during spring, with carbon bisulphide at three pints per 1,000 cubic feet, combined with a residual spray of DDT on the outsides of the silos, provided satisfactory control of primary and secondary grain beetles. A heavy infestation of bagged wheat at Seven Hills was controlled by fumigating with methyl bromide (1½ lb. per 1,000 cubic feet) plus residual spraying with 2 per cent. methoxychlor wettable powder. Tests with maize in 5-gallon drums, gave three to four months' protection by the use of malathion dust, whilst BHC dust continued effective for six months. Phostoxin did not give a complete kill when single tablets were inserted in individual bags of maize.

Flour Beetles (Tribolium confusum and T. castaneum).—A survey is being conducted at monthly intervals in a Metropolitan flour mill to ascertain the variation in populations of different pests at all times of the year. There has been little incidence of flour beetles in export flour inspected at Sydney wharves this season. This is in strong contrast to the position last season and is due at least partly to the recent advisory and regulatory activities by this Department and other bodies.

Tobacco Insects (Ephestia elutella and Lasiorderma sericorne).—Tobacco moth was a serious problem in tobacco factories during summer, and tobacco beetle was troublesome in cigarette factories, flour mills, food shops (in spices, curry) and in homes (cereal foods, seeds, poultry meal). Serious spotting of paper in finished cigarettes occurred, due to fragments of tobacco beetle in the tobacco.

WEED INSECTS

Crofton Weed Stem Gall Fly (Procecidochares utilis).—Whilst this fly does not appear to effect much control of Crofton weed in the Metropolitan area, evidence of its spread since it was released at Roseville in 1934 is often reported. It now occurs in the North Sydney, Lane Cove and Castlecrag areas and is well established at Balgowlah, some 6 miles from the release point.

FLOWER PESTS

Carnation Mites (Eriophyes sp.).—Carnation plants in a glasshouse at Cooma were heavily infested by large numbers of Eriophyid mites. These mites and eggs were abundant deep in the unfolding shoots, and caused the growing tips to turn pale-green and the leaves to fail to unfold, eventually browning off and dying. This mite appears to be identical with a species recently described in California as attacking carnations.

MISCELLANEOUS INSECTS

Soldier Beetles (Cantharis lugubris).—Huge swarms of these beetles occurred in various places during December-January, and again in March-April. They were reported at various centres throughout the coastal area, and inland at such places as Orange, Burren Junction, Parkes and Boggabilla. Generally, they had only a nuisance value, but they were recorded once to be nibbling the lower surface of ripening cherries, and on another occasion as being associated with very severe skin blemishes on newly set passion fruits. This was possibly due to the mechanical effect of these beetles in the blossoms, possibly also to excremental burning of the young skin.

ENTOMOLOGICAL COLLECTION

Major work on the transfer and re-arrangement of the collection in the unitary system was completed for the time being. Further work is suspended pending arrival of further cabinets, as all drawers are now in use.

Specimens were identified for head office and country entomologists, and for outside bodies, including quarantine authorities, Forestry Commission and pest control operators. Large numbers of ant specimens were sent away in connection with the Argentine Ant survey, and determinations obtained of fifty-five species. Descriptions published by the following workers involved material supplied by this Department:—

Hemiptera—

Wygodzinsky P.—Synopsis of the Australian *Emesinae (Reduviidae)*.

Dumbleton L. J.—The Australian *Aleyrodidae*.

Coleoptera—

Carne P. B.—A revision of the Ruteline genus *Anoplognathus*.

Specimens of a leaf-mining fly long known to mine in the leaves of *Pittosporum* sp. were submitted to Dr. Hering, an authority on this group, who identified them as *Phytobia* n.sp.

Chemist Branch

DAIRY CHEMISTRY

Factory Advisory Service.—Financial restrictions during the year prevented appointment of a dairy chemist for factory advisory work. Limited assistance, however, was given to the Division of Dairying.

Factory Managers' Conference.—Twenty samples of butter entered in Class 4 for the Factory Managers' Conference were analysed for moisture and salt content. Most of the samples conformed satisfactorily with Dairy Industry Act requirements.

R.A.S. Butter Analyses.—Twenty-seven samples of butter entered in Class 6 of the Dairy Produce Section of the Royal Easter Show were analysed for moisture and salt content. A number of samples failed to comply with specification requirements.

Butter Quality.—During the year a number of butter samples were examined chemically in an endeavour to explain flavour imperfections reported in them.

Dairying Industry Apprenticeship Scheme.—The Chief Chemist delivered two series of dairy chemistry lectures to apprentices indentured under the above scheme who attended schools arranged by the Department of Technical Education at Newcastle and Taree Technical Colleges. Both schools were unqualified successes.

Conferences of Senior and Junior Dairy Officers.—The Chief Chemist delivered a series of addresses on dairy chemistry and its application to factory practice at each of the abovementioned conferences held at Hawkesbury Agricultural College.

CEREAL SECTION

Effect of 1956 Wheat Season on Cereal Work.—The unreliable rainfall in our wheat areas during 1956 provided further evidence that excessive rain may limit wheat production as effectively as drought.

Excessive rain at sowing-time prevented planting in many areas, and so led to a considerable reduction in the total wheat harvest. This illustrates the difficulty of budgeting for wheat production in the State, and emphasises the importance of carry-over stocks to meet local requirements.

Whereas in 1955 the total sowings of 2,937,000 acres yielded 57,140,000 bushels of grain, in 1956 only 1,713,000 acres were sown yielding 29,000,000 bushels. Most of this reduced acreage can be attributed to the inability of farmers to sow their areas.

Weather conditions during the later stages of the 1956 crop were generally satisfactory. On the whole, the grain was bright and of good general condition, which was reflected in its high bushel weight.

To meet special requirements, f.a.q. wheat from northern areas was again kept separate from southern and western wheat, thus the quality of 1956 southern and western f.a.q. wheat may be compared directly with 1955 f.a.q. wheat.

Bushel weight of 1956 southern and western wheat was officially declared at 64½ lb., compared with 62 lb. for 1955 f.a.q. wheat.

The 1956 southern and western f.a.q. sample contained 8.9 per cent. protein, compared with 9.29 per cent. for 1955 f.a.q. wheat.

As the 1956 harvest approached, it became apparent that millers would be unable to purchase sufficient high-quality wheat to meet the requirements of the local "starch-reduced" or high-protein flour trade. When harvesting commenced it was revealed that wheat from areas that normally produce high-protein grain was of good general appearance but that the protein content was disappointingly low in comparison with grain from previous crops. Millers therefore were compelled to reduce their standard in protein content of premium wheat, and by this expedient purchased about the same quantity of premium wheat as from the 1955 crop.

From the 1956 wheat crop a total of 4,169,588 bushels was purchased at premium above f.a.q. price, premiums ranging from twopence to 4s. 6d. per bushel and averaging 1s. 7.25d. per bushel. Total amount paid as premiums was £334,533. (From the 1955 crop the total amount of premium wheat purchased was 4,177,224 bushels at premiums ranging from threepence to 3s. 9d. per bushel, average premium being 1s. 6.91d., and total amount paid as premiums £329,207.)

Early in 1956 it was feared that a bountiful wheat harvest in the State would have been difficult to store in view of the depressed world wheat market. Although the reduced harvest took care of this problem, it is still plain that the low quality of Australian wheat, by world standards, would have contributed to difficulty in marketing the crop.

Further, the difficulties with use of current wheat stocks are accentuated by the relatively low quality of wheat from the 1955 harvest.

Wheat Quality Investigations.—During the year the basis upon which the quality of wheat varieties has been assessed was reviewed in the light of statements to the effect that susceptibility of grain to starch damage during milling can be more important in determining baking quality than quantity and physical characteristics of protein in the grain.

The assertion that susceptibility to starch damage had been overlooked in the past made it necessary to review quality assessment, as wheat varieties have been recommended for extensive cultivation and plant breeders' samples have been assessed, largely on the basis of consideration of the wheat proteins.

Samples of varieties which had been assessed on protein characteristics, and which were stated to be of unsatisfactory baking quality, were tested, but no evidence was revealed to support the contention that baking quality had been incorrectly evaluated.

Cereal Control Work.—During the year, 504 samples were examined for export flour certificates, compared with 303 during 1955-56. Many of the samples were again representative of comparatively small tonnages of flour exported by private firms to areas where private trading is now encouraged. Some markets demand certificates showing a certified analysis of the flour. Requests for this type of certificate are increasing and indicate the highly-competitive nature of overseas markets. It is widely believed in the trade that flour exports could be expanded if the overall quality of flour offered could be raised significantly.

On behalf of Government institutions, 55 samples of flour were examined to determine suitability for breadmaking, compared with 64 samples during 1955-56.

Quality of flour supplied to the institutions has been generally satisfactory and no complaints were lodged about the samples submitted. When wheat from the 1956 crop was supplied to millers, there was a slight overall decrease in general flour

quality. The general quality of local bakers' flour has also shown a slight deterioration, but bakers have been able to accommodate their techniques to the flour available.

During the year 18 samples were examined on behalf of the Department of the Navy, compared with 42 during the year 1955-56. These samples are examined to determine whether they comply with specifications, the requirements of which vary according to the destination of the flour. One important consideration of flour supplied for use in ships is that moisture content must be low enough to ensure satisfactory keeping quality over a longer period than normally required of local flour.

Some complaints have been received from overseas Navy stations that baking quality of flour supplied has been unsatisfactory, but investigation revealed that baking procedure had not been adapted to the requirements of Australian flour.

Millers have become conversant with the requirements of flour for use by the Department of the Navy and, consequently, fewer complaints were lodged about the quality of flour submitted for examination.

Cereal Instruction and Advisory Work.—Most of the wheat sold at premium above f.a.q. price, and used principally for manufacture of "starch reduced" or high-protein flour, is grown in the North-western part of the wheat-growing areas and the premiums have proved an incentive for farmers to improve the quality of their grain.

Many north-western growers, however, consider the facilities for marketing their high-quality grain unsatisfactory—as they have been unable to hold their wheat on the farms and no provision has been made to stack the wheat at sidings pending negotiation of premiums.

With a view to overcoming the present difficulties, farmers in the premium wheat-growing areas have set up their own organisation, the Premium Wheat Growers' Association. They propose to stack all high-quality wheat at rail sidings, keeping separate the various classes of grain as differentiated by laboratory tests carried out in country areas.

Every assistance should be given to farmers to improve grain quality; accordingly, the executive members of the Premium Wheat Growers' Association have been helped as regards the classes of grain which should be segregated, also as regards the equipment necessary to assess wheat quality rapidly.

Assistance to Commonwealth on Wheat Grading.—The Australian Agricultural Council decided that a committee should be set up consisting of representatives of the Commonwealth and of the various State Departments of Agriculture, under the Chairmanship of the Director of the Bureau of Agricultural Economics, to review the question of introducing a wheat grading system.

To assist the Committee, information available in the Chemist Branch was collated, and graphs prepared showing variation in the quality of wheat produced in the State over a number of years. Officers of the Commonwealth have been helped to interpret the data available.

A considerable amount of information was available, but as there has been no specific project to investigate wheat grading, details of variation in quality of wheat delivered at specific points could not be provided.

Wheat Judging at Shows.—The competitive wheat classes at the Sydney Royal and country shows continue to interest farmers as a means of assessing why their wheat is placed in particular classifications for commercial use.

Two officers of the Chemist Branch were judges in the wheat section at the 1957 Sydney Royal Show, and an officer judged wheat at Narrabri Show.

Mill Room Operations.—A total of 516 wheat samples were received. Six hundred and ninety-two were milled—46 for plant breeders, 135 for experiment farms, 182 for farmers' plots, 183 for silos, 61 for the R.A.S., and 85 miscellaneous. A total of 692 wheat bushel weight determinations were made. Of 844 moisture determinations, 720 were of wheat, 107 of maize, one of rice, and 16 of beans.

The milling plant and apparatus have been maintained in good running order and condition. Various improvements have been made and a new method of grinding hard wheats has been evolved, with excellent results.

Waxy Sorghum.—Some intricate work involving reduction of "waxy sorghum" was carried out for the C.S.I.R.O. It was also requested that the TETROC content be reduced, if possible, and a reduction from 1,200 ppm to 20 ppm was obtained. This enabled the C.S.I.R.O. canning department to carry out some important work on canned foodstuffs. "Waxy sorghum" is a most difficult material to work on.

Norfolk Island Beans.—Important work on the moisture content of beans for storing purposes was done for the Norfolk Island authorities, and recommendations were made on suitable apparatus for them to purchase.

Gluten Survey Maps and Histograms.—More histograms, etc., of silo samples have been completed, and these have proved of great value to the Canberra authorities.

Gluten survey maps of silo receipts for the season are being prepared.

The assisting cereal technician spent some months at the Agricultural Research Institute, Wagga Wagga, following resignation of their cereal technician, and he again spent some time at Wagga Wagga to instruct and advise the new appointee on milling operations, etc.

M.I.A. AGRICULTURAL CHEMIST

Yanco Laboratory.—Construction of a chemical laboratory at Yanco Experiment Farm, commenced early in 1957, is expected to be completed in August. Local bodies, especially those connected with the rice industry, have made substantial financial contributions towards the laboratory. It will be used for research into problems of the rice and fruit growing industries, and general analytical work for the advisory services.

Citrus Quality in M.I.A.—Investigation of poor quality in M.I.A. oranges was continued during the year. Experiments to test effects of foliar spray applications of phosphates on fruit quality did not pass beyond the exploratory stage, owing to unfavourable seasonal conditions. However, it was found that calcium dihydrogen phosphate could be applied in this manner without damage to the trees, whereas ammonium phosphate seemed to cause slight blemishing of the skins of the fruit.

A survey is in progress to find if previous observations on the relationship between phosphate nutrition and fruit quality hold in Valencia oranges planted on "tri" rootstock. "Tri" (*Poncirus trifoliata*) is the most popular rootstock for new citrus planting in N.S.W. The results of the survey suggest that fruit quality in these young trees is not related to phosphate levels, phosphate not being deficient in most of the trees, but that nitrogen nutrition may be related to some aspects of quality. The survey also provides a clear indication of the relationship between potassium levels and fruit size.

PESTICIDES SECTION

Spray Compatibility.—Advice has been given to many inquirers on the practicability of mixing insecticides, fungicides, herbicides, for spraying purposes. This practice is not always advantageous, and may be dangerous, but can often be employed safely with a consequent saving both of time and labour.

Regulatory Work.—Complaints are often received about the quality of pesticides on the market. Where justified, these are investigated under the Pest Destroyers Act, and Stock Foods and Medicines Act, and, where necessary, legal action may be taken.

Spray Residues.—Investigations have been conducted on fruit samples, e.g., apples, pears, bananas, submitted from various Experiment Farms, involving analysis of spray residues derived from spray programmes.

Projects Involving Pesticide Residues.—The problem of pesticide residues on food is widely recognised overseas, especially in the U.S.A. where rigid legislation has been introduced to ensure residues are kept below the accepted tolerances. In this country, the problem has had comparatively little publicity, though the need becomes more urgent every year. With the limited facilities available in the Branch, certain projects have been carried out to assess associated toxicity hazards from the use of currently-approved pesticides on plant and animal life.

Mercury Residues on Apples.—The tolerance imposed by overseas health authorities in this case is nil; any residue remaining on fruit after an organic mercurial fungicide application could be classed as excessive, and the fruit rejected.

Two aspects of this problem have been considered:—

- (i) The period of time which should be allowed to elapse between the last spray application and harvesting. Experiments have shown that approximately 7 per cent. of the spray actually applied still remained on the skins of apples, even after twenty-one weeks. The Department at present recommends a period of four months between spraying and harvesting.

- (ii) The possibility that organic mercurials may exhibit systematic properties when sprayed on trees, and the consequent danger of a carry-over and build-up of mercurial residue in fruit from season to season. Work so far completed has given no evidence to substantiate this possibility.

Spray Removal from Fruit.—Because of the prevalence of excessive toxic, and visible but non-toxic, residues on fruit, particularly for export, the Commonwealth Government is concerned that if this state of affairs continues unchecked, it is only a matter of time before countries such as the U.K. will regularly reject overseas consignments of fruit, thus causing big losses to Australian growers.

As the result of a conference attended by representatives of the Commonwealth, C.S.I.R.O. and State Departments of Agriculture, submissions have been made to the Agricultural Council for a grant of money to provide facilities for a co-operative investigation by the C.S.I.R.O. and N.S.W. Department of Agriculture into suitable methods of alleviating this problem of excessive spray residues.

Cattle and Sheep Dip Investigations.—Investigation of formulations for cattle dipping was undertaken by an officer seconded to the University of Technology. The effect of salts, soils, and clays was determined with special reference to DDT formulations in dips. The crystal growth of suspended DDT particles was found to be a function of the concentration of the dispersing agents used.

Preliminary investigations were also undertaken to determine the stripping rates of certain formulations used in sheep dips.

SOIL SURVEY UNIT

The unit now has six officers—four graduates, and two survey assistants. Two of the four graduates are studying overseas—Mr. R. R. Storrier, on mineralogy at Rothamsted, and Dr. B. G. Davey, on seasonal changes in the levels of several elements in pasture, at the Macaulay Institute, Aberdeen. Dr. Davey has completed his work and will shortly return.

During the year one surveyor was lost to C.S.I.R.O. and one laboratory assistant resigned to take up teaching. The unit thus has two surveyors and two assistants for work in New South Wales. There are vacancies for three surveyors, four survey assistants and one laboratory assistant. Applications have been called to fill the position of laboratory assistant, there has been great difficulty of late years in filling the graduate positions on the unit's staff. This is due partly to lack of suitable graduates from the University (a position which should be rectified in a few years, following the recent appointment of Professor Collis-George as Associate Professor of Soil Science at Sydney University) and partly to unsatisfactory conditions of work, shown by the loss of three officers recently to C.S.I.R.O. Extensive negotiations have been undertaken in Great Britain to obtain suitable people for these positions. It now appears that two honours graduates are interested and may be recruited. Lack of laboratory space and staff still remain a chronic handicap to the unit's work.

SOIL SURVEY FIELD WORK

Lucerne Problem, Temora Experiment Farm.—A brief survey was carried out on the farm and the report will soon be compiled.

Wee Waa Survey.—150,000 acres were surveyed as a joint project with the Water Conservation and Irrigation Commission in the Wee Waa district. This was done to enable choice of a suitable area for irrigation by the waters of the Keepit Dam. An experimental site nearby on the Namoi River was also surveyed. The report is partly completed.

Alstonville Tropical Fruit Research Station.—The Tropical Fruit Research Station, Alstonville, was surveyed and the map and report are ready for reproduction.

Bellinger River Area.—To assist fertility investigations in this area, a soil survey of some 200 square miles has been commenced. The field work is expected to occupy another four or five months.

Hawkesbury River Flats.—Salted areas on a portion of these flats near Richmond have been surveyed. Preliminary analyses early in the year showed very high salt levels in some of these areas. For this reason more detailed work was undertaken. A map has been produced and sampling is in progress to find the distribution and source of the salt. Water-table investigations will be the next step.

Soils Laboratory.—The soil chemist has given considerable time to investigation work on soils from the Capertee area (Central Tablelands), studying mainly phosphorus and potassium. Various analytical methods have been compared in an attempt to obtain a satisfactory method of determining "available phosphate" in these soils. This entailed field, glasshouse and laboratory studies. The laboratory results are now being correlated with responses in the glasshouse and field experiments.

A large number of soil samples submitted by field officers, and some by the public, have been examined.

Analytical work on soil samples from the vegetable rotation trial by Hawkesbury Agricultural College, submitted by the Division of Plant Industry, is proceeding.

The "basic superphosphate" studies have been completed and a report prepared.

Work on nitrogenous fertilisers-lime mixtures has also been completed and a report is being compiled.

WATERS, GEOLOGY, GEOCHEMISTRY

Ground-Water Hydrology Conference.—The senior chemist, together with Mr. Bowmaker of the Division of Plant Industry, represented the Department at the discussion group on ground-water hydrology at the Commonwealth Research Station, Merbein, on 13th, 14th and 15th November. Other bodies represented were the C.S.I.R.O. Division of Soils, C.S.I.R.O. Irrigation Research Station, C.S.I.R.O. Land Research and Regional Survey Section, C.S.I.R.O. Agricultural Research Liaison Section, C.S.I.R.O. Regional Pastoral Laboratory, Deniliquin, the Commonwealth Bureau of Mineral Resources, the Departments of Agriculture of Victoria, South Australia and Western Australia, the Departments of Mines, Victoria and South Australia, the Water Conservation and Irrigation Commission, N.S.W., the State Rivers and Water Supply Commission, Victoria, the Engineering and Water Supply Department, South Australia, the University of Melbourne and the University of Technology.

Subjects dealt with included ground-water problems in the Riverina Plains of south-eastern Australia, infiltration, surface drainage, tile and mole drainage, ground-water pumping, seepage, reclamation, geophysical and electrical resistivity methods, deep boring by jetting, needs of individual authorities and a future programme on ground-water problems.

Demineralisation of Saline Water.—An interesting visitor to the Branch was Dr. Juda, Executive Vice-President of Ionics Incorporated, a U.S. firm manufacturing equipment for demineralisation of saline waters. Dr. Juda was given information on types of water in this State which could be treated for use by stock. Particular attention was given to economic considerations. At present costs appear to be high.

Western Division Conference.—Owing to flood the 28th Annual Conference of Pastures Protection Boards and graziers of the western division of New South Wales was held in Sydney. Two officers of the Branch attended appropriate sessions. Arrangements were made for Dr. Juda, mentioned above, to speak on the electro-dialysis method of demineralising saline waters.

Radio Talk on Water Quality.—A six-minute recorded interview on "water quality" was recorded by the Senior Chemist and Mr. Walker, of the Division of Information, for use over country radio stations.

Lecture on Irrigation Water.—Two officers attended the water supply session of the agronomists' conference at Hawkesbury Agricultural College. The Senior Chemist spoke on "Quality of water for irrigation".

Visit to State Tile Works, Blacktown.—The Senior Chemist, with Mr. Hughes, of the Department of Public Works, and Mr. Hobbs, in charge of the latter's manufacturing agents' laboratory, investigated the soils and rocks at the State Tile Works, Blacktown. During a visit to Blacktown Mr. Hobbs and the Senior Chemist examined open cuts in Wianamatta shale and cores from a bore put down some 50 feet deep in the underlying strata. A report, with general classification of the samples, was forwarded to the Department of Public Works.

GENERAL WATER ANALYSES

Drought in the State during the second half of the year was responsible for a large increase in the number of samples of water submitted for analysis and recommendations on suitability for stock, irrigation and pastoral domestic use.

During the first six months of the year, 169 samples were submitted from direct sources, and 98 from the Water Conservation and Irrigation Commission. During the latter six months, 436 samples were from direct sources and 161 from the Water Conservation and Irrigation Commission. Total for the year was 864 samples.

Many enquiries on water purification, etc., were dealt with. Radio talks and Press items provided information to the public on the Department's water analysis service.

Fluorine Analyses.—All samples of water submitted this year by the Water Conservation and Irrigation Commission were again scheduled for examination for fluorine content, but owing to the big-drought caused demand for the Branch's services a backlog remains in this section.

Progress has been made on a survey map showing the location and concentration of fluorine in underground waters in New South Wales. This work will be expanded as time permits.

PLANT NUTRITION SECTION

Methods for Determining Molybdenum.—The methods for determining molybdenum have not been wholly satisfactory, so the formally adopted method has been revised. Results from this new method have given good correlation between duplicates with good recoveries and results now seem satisfactory.

A new molybdenum technique has also been developed for determining molybdenum in superphosphate.

It was suspected that the molybdenum in some batches of labelled molybdenised superphosphate was either unavailable or, in some cases, absent. Suspect samples submitted to this laboratory were analysed and found to contain molybdenum at approximately the levels claimed to have been added.

Spectrographic procedures have been modified to permit a 50 per cent. increase in the volume of work. Ashing techniques have also been modified to enable complete ashing of the material in one vessel instead of several. This saves considerable time.

Analysis for Diagnostic Purposes

Salt.—Large numbers of samples were submitted during the year for salt analyses. Samples from a wide range of crops in practically all areas of New South Wales were analysed and found to contain toxic quantities of salt. Salt damage is not limited to the irrigation areas; it occurs in isolated pockets throughout the State.

An interesting lead which resulted from salt analysis is the variation in salt uptake by citrus trees grown on different stocks. Although the uptake may have been influenced by other factors, there are indications that trees growing side by side, one on Trifoliata stock, the other on rough lemon, had a different salt uptake. The leaves from the tree on Trifoliata stock contained approximately 0.9 per cent sodium chloride, whilst the leaves from the tree grafted on to rough lemon had only .06 per cent.

Spectrographic Work.—A very wide field of work has been covered in the spectrographic section. Grapes, citrus leaves, apples, pears and most crops have been analysed, and suggestions made as to the nutrient status. Many of the suggestions have been adopted on a small scale for a start, and subsequent fertiliser applications have helped to substantiate the conclusions drawn from the spectrographic work.

Tomato Glasshouse Work.—Manganese and magnesium deficiency have been diagnosed in glasshouse tomatoes with the help of the spectrograph. The incidence of these two deficiencies now seem to be fairly widespread. It is hoped during the coming year to extend these investigations.

Manganese.—Manganese toxicity was recorded in cauliflowers, cabbages and beans in a number of areas in N.S.W. The most striking example was in the metropolitan area where cauliflowers were grown on a soil with a pH of 4.5. Leaves analysed from these plants indicated there were approximately 4,000 ppm of manganese present; normal cauliflower leaves usually contain 30 to 40 ppm.

Manganese deficiency was diagnosed in citrus and vegetable crops in many areas of N.S.W., including the M.I.A., Gosford and metropolitan area.

Boron.—Chemical analysis has helped confirm suspected boron deficiency in crops such as pears and beetroots.

Boron toxicity (caused in an unusual manner) was recorded in citrus in the metropolitan area. Information supplied by the Biological Branch indicates that the affected trees were treated with sawdust impregnated with borax. Borax is commonly used as a wood preservative. However, many plants are sensitive to excessive quantities of boron.

Protein Analysis of Pastures

I.C.I. Funds.—In 1957, I.C.I. made a grant to the Department of Agriculture. From this, the Chemist Branch has received the full-time services of an assistant, Mr. B. Barkus, a Kjeldahl Unit, and a Wessberg and Tulander Drying Oven. Even without the use of the new Kjeldahl Unit, the Wessberg and Tulander, some 100 protein determinations have been carried out since 7th January, the date of Mr. Barkus' arrival. Protein studies have been made on samples submitted from a number of areas in N.S.W. It is expected that with the new equipment operating, most Departmental requirements of protein determinations on pasture can be met.

Serrated Tussock.—The plant nutrition unit has conducted analyses for the Division of Plant Industry, on serrated tussock in the Bathurst area. Where serrated tussock has been burnt or mowed, the protein content shows a very significant increase in the re-growth. The protein in the young serrated tussock is at approximately twice the level of the protein in the older material. Where fairly heavy rates of nitrogenous fertiliser have been applied to serrated tussock, there is not a very significant lift in the protein content, but animals grazing on these plots have shown a marked preference for the nitrogen-treated plants.

Grafton Experiment Farm.—Studies of the protein content of summer grasses have continued in co-operation with Grafton Experiment Farm.

Analysis of Samples from Plant Nutrition Unit Co-operative Field and Pot Trials

Molybdenum Analysis, Field Trials, Glen Innes and Tia.—Interesting results have been obtained on the effect of phosphorus and sulphur deficiency on the level of molybdenum in legumes. Lucerne from Glen Innes, where sulphur was the only deficiency, accumulated very high molybdenum when applied in the absence of sulphur. This indicates that with sulphur-deficient soils it might, under certain circumstances, be dangerous to use heavy molybdenum dressings, as the pasture plants may take up excess molybdenum and endanger stock. It is known in England, for example, that where pasture contains about 16 ppm of molybdenum, stock grazing on these pastures have been affected with scouring or teartness. Secondly, where sulphur was applied, the levels of molybdenum in the pasture were low, though the plants did not show any visual symptoms of molybdenum deficiency. It may be that continual applications of sulphur alone might ultimately induce a molybdenum deficiency.

Where both sulphur and molybdenum are applied together, the molybdenum content of the plant material was normal.

Similar work has been carried out on white clover from Tia, where the soil is deficient in both phosphorus and sulphur.

Digitalis.—Market gardeners in the Eastwood district have been growing digitalis species to supply Burroughs Wellcome with the alkaloid Digoxin. Previously all Digoxin supplies were imported.

Because there was no local knowledge on desirable fertiliser practices in the culture of digitalis, the plant nutrition unit set up nutritional trials to advise the farmers and Burroughs Wellcome on the most satisfactory fertiliser methods for growing this species.

Maize Studies.—Maize nutrition in the County of Cumberland has been studied from three aspects. Studies have been made in the glasshouses at Hawkesbury Agricultural College. This has been followed up by field trials and a survey of maize nutrition in the County of Cumberland.

Apples, Penrose.—Over the past twelve months, levels of nitrogen, phosphorus and potash have been studied in the leaves of apple trees from a comprehensive factorial trial established by the plant nutrition unit. It is proposed during the coming year to study levels of these nutrients in trees from one of the better orchards of the State, owned by Mr. Savage at Orange, to enable comparisons between nutrient levels obtained from trees grown on a naturally poor soil (Penrose) and a naturally fertile soil.

Samples from Pot Trials.—Chemical analysis has provided useful data in the interpretation of glasshouse experiments, and additional information on critical levels of phosphate, nitrogen and sulphur on various species.

Field Trials

In co-operation with the Division of Plant Industry, field trials have been conducted in the Capertee, Spring Ridge and Coonabarabran districts. Following requests from the farming community in the Bellingen area, detailed trials have also been initiated there.

At Capertee an assessment was made on ammoniated superphosphates and lime-pelleted seed. The trials showed that ammoniated superphosphate will in no way assist nodulation whereas lime-pelleted seed is just as effective as 50/50 lime-super, from a nodulation point of view, in establishing legumes. However, in the first year, regeneration of plants grown from lime-pelleted seed did not appear to be as good as that of plants treated with 50/50 lime-super.

This failure to regenerate on plots sown with lime-pelleted seed is being investigated this year. These plots have been divided into four parts—one section has been treated with superphosphate, the second with lime, the third with lime-super and the fourth is untreated.

During autumn of 1957 thousands of acres were sown down to lime-pelleted seed. If even a fraction of these areas fails to regenerate, farmers are likely to suffer heavy losses. Information should be on hand at the end of 1957 or early in 1958 as to the effect of topdressing plots originally sown with lime-pelleted seed. It may be that regeneration of the clover plants could be greatly assisted by one of the three treatments mentioned.

It must be remembered that the Capertee soil is a good testing ground for rhizobium, but the nodulation problem is more acute than in most other areas of the State. Already favourable reports have been received from other parts of the State on regeneration of clover established with pelleted seed.

At Walcha, an area where there is both phosphorus and sulphur deficiency, elaborate trials have been prepared to study the interaction of phosphorus and sulphur in the plant. Some data may be obtained from these, to guide the farmer on frequency of superphosphate and gypsum applications.

This soil is also very acid, and lucerne establishment is a problem. In lime trials it was observed that heavy lime is necessary to establish lucerne satisfactorily. Normal techniques such as lighter liming, lime-pelleted seed, 50/50 lime-super usually satisfactory to establish *Trifolium* species, were quite unsuitable for lucerne.

Detailed work in liming rates in relation to lucerne establishment is now in progress in the glass house.

In the Spring Ridge-Coolah district, six trials were established to study the residual effect of sulphur and to observe the behaviour of plants treated with a new sulphur boosted super.

Co-operative Pot Trials

Glasshouse Work at Hawkesbury Agricultural College.—In co-operation with the Division of Plant Industry, the plant nutrition unit has studied soils from Walcha, Capertee and metropolitan districts. These studies have substantiated work carried out by some of the field trials and have been supplemented with laboratory work.

Fertilisers

Fertiliser Unit Values.—Unit values of fertilisers for 1957 have been worked out by the plant nutrition unit. Among the fertilisers are several new ones worthy of note. One new fertiliser from Germany, known as Nitrophoska, is extremely concentrated and contains high levels of nitrogen, phosphorus and potash. Fertilisers such as this deserve attention particularly where it is necessary to transport them over long distances when freights are so expensive.

Biuret in Urea.—Urea, a comparatively new fertiliser on the market, contains approximately 48 per cent. nitrogen. This material is being welcomed in many of the farming areas, but it may have a disadvantage or two. Biuret is toxic to plant life at certain levels. In the University of California it was found that urea containing more than 2.5 per cent. biuret, used at the rate of 6½ lb. per tree as a soil dressing, was toxic to citrus. Also 0.25 per cent. used at the rate of 9 lb. per 100 gallons was toxic as a spray. The symptom caused on fruit trees by biuret is known as "yellow tip"; as the name indicates, a yellowing on the tip of the leaf. There have been several instances of suspected biuret damage on fruit trees brought to the notice of the plant nutrition unit.

Investigations have shown that where trees have been suffering from the symptoms described above, urea known to have a high level of biuret has been used in these areas.

Isotopes.—Isotope studies have been initiated by the plant nutrition unit, Dr. Redies and Dr. Green of the University of Technology. The first project it is hoped to study is molybdenum levels in superphosphate. Dr. Green has offered to make available certain facilities at the University of Technology to assist in this work, and it is expected that some of the glasshouse work can be carried out at Hawkesbury Agricultural College.

GENERAL

Awards of Doctor of Philosophy Degree. Messrs. Davey and Redies received their degrees of Doctor of Philosophy during the year, for research work carried out during the last two years at the Macaulay Institute for Soil Research, Scotland, and University of Sydney, respectively. Dr. Redies carried out absorption spectra investigations for his degree. Dr. Davey studied the plant nutrient status, under varying conditions, of pasture species established at the Macaulay Institute.

Dr. Davey studied for his degree under the terms of a Thomas Lawrence Pawlett Scholarship. Officers of the Chemist Branch have been awarded three of the four scholarships over the last four years; the latest recipient is Mr. D. N. Munns who will proceed to the University of California soon for advanced studies in plant nutrition problems.

Colombo Plan.—A number of students under the Colombo Plan spent some time in the Branch in appropriate sections.

Legal Chemistry.—In collaboration with the seeds officer, Division of Plant Industry, soils and plant material submitted by the Criminal Investigation Branch, in connection with a motor accident on Gundagai Bridge, were examined. Similar work was done on soil material in connection with an alleged theft from a Sydney factory.

Meatmeals from Abattoirs.—Moisture and fat determinations were carried out on two samples of meatmeal from the Wagga Municipal Abattoirs.

A sample of meatmeal taken from the first cook from the Gunnedah Municipal Abattoirs was analysed. Results showed the meal to be of high protein but low moisture content.

COMMITTEES AND CONFERENCES

Soil Survey Advisory Committee.—Restricted finances prevented development of new long-term soil survey projects, and it was thus unnecessary to call meetings of this committee.

Plant Nutrition Committee.—A number of meetings of this committee were held during the year to discuss results of field trials previously put down by the plant nutrition unit and to plan new trials for study of latest pasture developments already observed on a small scale.

Pest Destroyers Act Committee.—The Branch is represented on this committee, which has been set up to review applications for registration under the Act.

Veterinary Medicines Act Committee.—The Chief Chemist continued to represent this branch on this committee, which met on numerous occasions during the year to consider applications for registration under the Act.

Civil Defence Food and Agricultural Research Committee.—

The Chief Chemist was nominated as a member of this committee, which was formed by the Director of Civil Defence to review, firstly, all available information on effects of radioactive fall-out on food and agriculture, and secondly, to proceed with relevant experiments to obtain any further details required for this important problem.

W.A.R.I. Advisory Committee.—The Chief Chemist and Senior Chemist acted on this committee during the year.

Conference to Consider Protein Content of Starch-Reduced Flour.—An officer of the branch attended a conference called by the Department of Public Health on Friday, 6th July, to consider the standard set under the Pure Food Act for protein content of flour and in the manufacture of starch-reduced or high-protein bread.

Standing Advisory Committee on Wheat.—An officer of the branch attended a meeting of the Standing Advisory Committee on Wheat to consider the wheat varieties to be recommended for the 1957 sowing.

Symposium on Automation.—The Chief Chemist deputised for the Under Secretary and Director at the opening sessions of a symposium on the subject "Automation and Australia", held at the N.S.W. University of Technology, Kensington.

Cereal Chemistry Conference at Wagga.—An officer of the branch attended the sixth Annual Conference of the Cereal Chemistry Group of the Royal Australian Chemical Institute, held at Wagga on 10th to 12th October. The day session of

the conference, held at the Agricultural Research Institute, were attended by sixty delegates representing Government institutions and private industries, mainly from New South Wales, Victoria and South Australia.

Sixth International Congress of Soil Science, Paris.—Messrs. B. G. Davey and R. R. Storrier of the soil survey unit attended the Sixth International Congress of Soil Science held at Paris from 28th August to 17th September, 1956.

Both officers proceeded overseas on study leave under the terms of a Pawlett Scholarship. Mr. Davey being located at Macaulay Institute for Soil Research, England, and Mr. Storrier at Rothamsted Experimental Station, United Kingdom.

Papers presented at the Congress, together with discussions that followed, were of great value to Messrs. Davey and Storrier in connection with their own research work. Contacts made at the Congress with world authorities in their respective field will enable them to follow up, in more detail, specialised aspects of their respective research projects.

Western Division Conference.—Two officers attended (see Waters Section).

Ground Water Hydrology Conference.—Senior Chemist attended (see Waters Section).

Bread, Flour and Wheat Improvement Convention.—An officer of the branch attended the Bread, Flour and Improvement Convention at Wagga last November. The convention was the tenth annual convention held in Wagga and proved to be the most successful, being attended by a more representative cross-section of members of the bread manufacturing, flour milling and wheat growing industries.

LIBRARY

Further valuable publications received by the branch during the year have contributed greatly to officers keeping abreast of latest scientific developments in their work.

CORRESPONDENCE

Numerous contacts have been made and maintained with overseas authorities in the United Kingdom and the United States of America concerning agricultural problems of importance to this branch.

Botanist Branch

BOTANIC GARDENS, NATIONAL HERBARIUM AND ALLIED ACTIVITIES

Maintenance of the areas and collections under our control and the discharge of routine duties were kept at a satisfactory level considering staff shortages. Owing to the financial position an average of 20 vacancies existed during the year. Some important results were obtained in botanical research. Details of sectional activities are as follows:—

BOTANIC GARDENS

The general condition of the Botanic Gardens was satisfactory, but maintenance of lawns could be improved by the use of more efficient machinery.

The rainfall for the year was exceptionally low, only 2,415 points (2,065 points below average) being recorded. Rain fell on only 97 days (average, 143 days).

Improvements.—The important area leading from the Garden Palace Grounds to the Botanic Gardens was redesigned and two new beds constructed to demonstrate the effects of texture in plantings. Forty-three different species and large numbers of ground-cover plants were used in these beds.

Some 60 specimens of shrubs were planted in the seawall shrubbery and many shrub and tree species were set out in shrubberies from which duplicated specimens had been removed to make space for species new to the Gardens. Six new species and varieties of conifers were planted out in the new conifer bed. Swamp and bog plants from a local coastal lagoon and swamp areas were planted around the ponds in the Lower Gardens, a portion of the flower-bed lawn in which was relaid with buffalo grass, replacing areas previously infested with kikuyu grass. A large planting of *Clivia* was made in a palm bed adjacent to the Kiosk.

Express Highway.—Construction of the Circular Quay Roadway and Eastern Distributor caused a major disturbance in parts of the Inner Domain and necessitated construction of new entrance gates to the Botanic Gardens and Government House. New roadways and paths were constructed and portion of the area was redesigned, but many trees and shrubs were

lost and it will be some time before the whole area can be redesigned and planted. Extension of the highway through the Gardens and Domain is being considered and plans have been drawn up for consideration by the Trustees.

Landscape Gardening Service.—Mr. A. E. Wilson, Landscape Gardener, returned to duty after a year's leave during which he studied landscape work in many European countries.

The Landscape Gardening Service was particularly active. Mr. Wilson visited and prepared suitable plans and reports for the following:—

Wagga Agricultural College; Junee Municipal Parks; Lower Murray Research Station; Gosford Citrus Research Station; Scheyville Migrant Centre, Windsor; Flora Reserve, Bundanoon; Carlingford High School; Clemon Park Public School; Polio Auxiliary, Turramurra; Kirribilli House; St. Matthew Church, Ashbury. Mr. Wilson also accompanied Mr. Correy to Sutherland Shire where they inspected and advised on plantings in the Seymour Shaw Park. At Coff's Harbour Mr. Wilson addressed the Horticultural Society on "Shrubs for the North Coast and their Culture".

Mr. A. D. Correy inspected and supplied plans for the following: Walgett Bowling Centre; Qantas Terminal at Kingsford Smith Aerodrome; District Hospital, Cooma; Kyogle High School; Penshurst Home Science High School. He also attended Agricultural Bureau Conventions and gave addresses on "Landscape Design" at Wallabadah, "Principles of Garden Design" at Dorrigo, and on "Modern Landscaping" to the Roseville Chase Garden Club and the Geranium Society.

The Chief Botanist visited Tamworth Agricultural Experiment Farm and discussed tree planting in the grounds and in Anzac Memorial Park.

Spraying Activities.—Dry conditions made spraying more effective, as spray materials were rarely washed off by heavy downpours as in the previous year. Lace-bug infestation on Azaleas was brought under control, the plants looking cleaner and more healthy than for some years. Unfortunately, some of these plants have *Armillaria* root-rot, which is treated, or cut out, as occasion demands.

Attention was given to control of scale insects on shrubs and trees. More time was available for spraying annual plants to control aphids, leaf-miners and leaf-eating caterpillars. A slight infestation of citrus gall wasp in one section was suitably treated. Magnolia buds were sprayed with Quassia extract to ward off the attacks of bul-buls, and appropriate spraying was undertaken to control such diseases as mildew, rust and *Exobasidium* leaf-gall on Azaleas.

Glasshouses.—A new boiler was installed and plans were made for more effective distribution of heating.

Some fine floral displays set up during the year attracted considerable public interest. Plant and floral decorations were provided at Parliament House, other Government Departments and the Royal Agricultural Show.

Acquisition and Exchange of Plants.—Twenty-four species of shrubs and glasshouse plants were brought from the Royal Botanic Gardens, Kew, England, by Mr. Wilson; 24 glasshouse and indoor plants were received from Napier, New Zealand; 170 rose plants from the Ryde School of Horticulture; 21 poplars and willows from the Forestry Commission of New South Wales; three plants of *Chorisia speciosa* from Dr. Hewitt, Bellingen; a plant of *Sequoia sempervirens*, "California Redwood", and a number of plants of *Calanthe veratrifolia*, "Scrub Lily", from local sources.

More than 100 plants of *Azalea* and *Hydrangea* were supplied to Hawkesbury Agricultural College; over 50 glasshouse plants to the Conservatory, McHattie Park, Bathurst; selected *Fuchsia* plants to the Nielsen Park Trust for the grounds of Vacluse House; 20 plants to the Polio Auxiliary, Turramurra; and about 100 Coffee seedlings, propagated in our nursery, were forwarded to the Fruit Officer, Murwillumbah.

General.—Inspection tours of the Botanic Gardens were conducted by staff members for such organisations and societies as the Royal Australia Historical Society, Sydney Conference of Superintendents of Parks and Gardens, University lecturers and demonstrators, Hurstville Horticultural Society and senior pupils of Birchgrove Public School.

A member of the staff judged the annual garden competition of the Tramway and Omnibus Depot gardens.

Two Colombo Plan Fellows, attached to the staff for varying periods, were instructed in routine administration and outdoor working of the Gardens.

Delivery was taken of a new 2-3 ton truck to replace an unserviceable vehicle, and a new petrol bowser has been erected in the Depot.

Stonework around one of the main ponds has been reset. A statue, symbolising Spring, presented by Miss Stedman of Wollstonecraft, has been placed at the eastern end of the Spring Walk.

Police action was taken to remove undesirable persons. They had formed the habit of remaining in the grounds after closing hours. Several successful prosecutions were made.

NATIONAL HERBARIUM

The collection was maintained in satisfactory condition and considerable progress was made in research.

Plant Species New to New South Wales.—The following species, with locality of collection as shown and the country of origin, or previously known distribution indicated in parenthesis, were recorded for the first time in New South Wales:—

Atriplex turbinata, Preservation Creek, west of Milparinka (South Australia)

Bassia andersonii, Olive Down Station, north of Tibooburra (far north of South Australia). Two previously undetermined specimens from Queensland also proved to be this species, making a new record for that State.

Bassia paradoxa var. *latifolia*, Winnathee Station, 60 miles west of Milparinka (Central and South Australia).

Bassia parviflora, 70 miles south-west of Ivanhoe (Victoria, South Australia and Western Australia).

Chenopodium ulicinum, localities on the far Western Plains. This species was previously confused with small-leaved individual of *C. nitrariaceum* (South Australia).

Carex jackiana, near Mt. Kosciusko; (India to Malaysia; Victoria).

Erodiochrysum eldredii, 60 miles south of Broken Hill; (South Australia).

Eucalyptus chapmaniana, near Khancoban, Upper Murray River. This specimen was collected 25 years ago, but prior to this determination the species was known only from one small area near Mt. Bogong (Victoria).

Eucalyptus incrassata var. *costata*, 70 miles south-west of Ivanhoe; (South Australia and Victoria).

Pavetta australiensis, near Kyogle; (Queensland).

Persoonia confertiflora, Green Cape on the far south coast; (East Gippsland, Victoria).

Planchonella laurifolia, Moobal State Forest, Tweed River District; (Queensland).

Zygophyllum humillimum, Mt. Woods Station, east of Tibooburra; (South Australia).

Naturalised species.—The following species of exotic plants were recorded as having become naturalised in New South Wales:—

Eryngium sp., probably *E. Maritimum*, a native of European coastal areas recorded as established on an area behind the sand dunes at Old Bar, near Taree.

Kalanchoe longiflora, a native of Natal but commonly cultivated, is naturalised 20 miles south of Broken Hill.

Opuntia imbricata, "Devil's Rope", occurring as a considerable stand in the Cobar district.

Trifolium lappaceum, "Bristly Clover", a native of the Mediterranean region, established at Jerilderie. This species has been known from South Australia for some time.

Records of Rare Species.—The following species, very rarely collected, were identified:—

Atriplex prostrata, at Lake Benanee, near Euston; the first record for over 70 years, though the plant is not uncommon in the area.

Blumea mollis, near Grafton; collected only once previously. The species is widespread throughout the tropics of the Old World.

Burnettia cuneata, in the Robertson-Jamberoo area.

Caladenia lyallii, from the Kosciusko area; only one other specimen in this Herbarium.

Calandrinia volubilis, at Box Creek, far west area; second record.

Chloanthes glandulosa, at Linden, Blue Mountains; second record.

Cyperus bulbosus, at Paldrumatta Bore, near Milparinka, collected in 1901, but previously undetermined. A second record for this species. The bulbs were eaten by the aborigines.

Diplazium maximum, in Orara State Forest, near Coff's Harbour.

Hygrophila salicifolia, from Casino; second record only.

Parsonia leichhardtii, in Mt. Boss State Forest, north-west of Wauchope.

Rumex bidens, in Lake Whymoul, near Barham, on the River Murray. This is the only collection of this species made in New South Wales this century; the only previous record was given vaguely as River Murray. The species is most unusual in having swollen stems with much air-holding tissue.

Schoenus calypttratus, in the Mt. Kosciusko area; fourth record.

Scirpus montivagus, in Mt. Kosciusko area; second record;

Extensions of Range.—Field observations by the botanical staff and other collectors increased the known range of the following species as indicated:—

Didymocheton rufum, southwards to near Wingham on the Manning River from Port Macquarie.

Bulbophyllum minutissimum, southwards to Kiama from the north coast and Port Jackson (in early records only).

Endiandra crassiflora, southwards to Mt. Boss State Forest, near the Hastings River, from the Dorrigo-Bellinger River district.

Eucalyptus morrisii, southwards to Mt. Hope-Euabalong from Cobar.

Eucalyptus punctata, "Grey Gum", northwards to Kippara State Forest from south of the Hunter River.

Eucalyptus sparsifolia, "Narrow-leaved Stringybark", as for *E. punctata* above.

Hakea propinqua, southwards to Green Cape on the far South Coast from the Illawarra district.

Mariscus laevis, westwards in the Quambone district of the north-west plains, formerly known only from the coast district and Queensland.

Pandorea jasminoides, southwards to Bril Bril State Forest, Hastings River, from the Richmond River.

Persoonia levis, northwards to the Macleay River district from Camden Haven.

Persoonia linearis, northwards to the Macleay River district from the Hastings River.

Persoonia tenuifolia, southwards to Barcoongere State Forest, near Coff's Harbour, from the far Northern Tablelands and Queensland.

Schizaea rupestris, south-eastwards to Minnamurra Falls Reserve, three miles west of Jamberoo, from the Sydney and Blue Mountains area and Bundanoon (where it was recorded in last annual report).

Selliera radicans, westwards to Tarago on the tablelands from coastal areas.

A specimen collected by a member of the botanical staff of the Lamington National Park, Queensland, has been identified as *Cyathea woollsiana*, previously unknown north of Gippsland, Victoria. This species could quite possibly be discovered in the intervening area of New South Wales.

Exchanges with other Institutions.—2,890 herbarium specimens were received from 14 overseas and four Australian institutions. In exchange, 2,930 specimens were sent to 26 overseas and two Australian institutions.

Exchanges included some special collections such as 32 Macquarie Island species from the National Herbarium, Victoria; 136 tropical species from the C.S.I.R.O.; and 327 Central Australian species from the Animal Industry Branch, Alice Springs; also certain despatches such as 12 mosses to Pennsylvania; 50 ferns to the Smithsonian Institute, Washington; 87 Eucalypts to Brisbane; and 20 Eucalypts to Rome. In addition, many hundreds of specimens, collected by visiting botanists and identified by our staff, were forwarded to Dr. R. Pichi-Sermolli, of Florence, Italy; Dr. P. Vermuelen, of Amsterdam, Holland, and Dr. H. Eichler, of Adelaide.

Loans of our herbarium material of the genera *Clematis*, *Haloragis*, and *Millotia*, and the family *Haemodoridae* were made on request. Specimens of the genus *Diuris* were obtained on loan from Brisbane Herbarium, and our own material of the family Sapotaceae was returned from Leiden, Holland.

Special Additions to Herbarium Collection.—Mr. G. V. Scammell, whose drawings were used to illustrate Rupp's "Orchids of N.S.W.", has donated his orchid herbarium of 300 specimens of native and certain Malayasian species to the National Herbarium. These are a valuable addition to our collection.

Field Collections and Seed Exchange.—The Seed and Plant Collector undertook five major collecting trips, of six to fifteen days to the following areas: Camden-Yerranderie-Tomit Creek; Bulladelah-Coff's Harbour-Grafton-Ebor and Dorrigo; Bathurst-Orange-Milthorpe; Cowra-Grenfell-Weddin Ranges; Far North Coast (Tweed Heads-Mebbin Ranges), as well as four minor trips in the Hawkesbury sandstone areas of the coastal belt, covering a total distance of 5,890 miles, during 60 days in the field. In addition, 12 field days were occupied in collecting in the metropolitan and lower Blue Mountains areas. Altogether, 528 numbers were collected as bulk herbarium specimens for our own herbarium and overseas exchange, and 150 collections of seed were made in bulk quantities for exchange purposes.

Collecting is becoming more and selective, as the collector, necessarily, now spends more time in searching for specific plants, and fewer specimens were collected this year.

Following requests, 249 seed samples were forwarded to 26 institutions in Europe, Asia and North America, and to three in Australia. In exchange, 202 seed samples of species selected by us were received from 27 overseas institutions and six Australian sources.

Research.—For the projected publication "The Flora of New South Wales", material was prepared dealing with the genera *Phyllota*, *Eutaxia*, *Pultenaea* and *Dillwynia* of the family Leguminosae; these include some 65 New South Wales species. Manuscript dealing with the genus *Macrozamia* of the family Cycadaceae is almost complete. Analytical keys to the families of Gymnosperms and of the Monocotyledons were prepared for inclusion in the first part of the "Flora".

An examination of the *Zygophyllum fruticulosum* material revealed that the species proper is confined to coastal Western Australia. The New South Wales material is divisible into two species *Z. eremaeum* and *Z. aurantiacum*. Both are found on the Western Plains of New South Wales and extend into other States.

The identity of the species of *Quercus*, "Oak" has been checked and the nomenclature brought up to date. Labelling of the Oaks in the Botanic Gardens, where some 25 species are cultivated, has been brought into line with this work.

The collections of Australian and exotic species of *Helicia* (family Rutaceae) and allied genera were re-examined and determined according to a recent revision by Sleumer. The species formerly known as *H. bauerlenii* must now be known as *H. ferruginea*. This is fairly common in rain forest country of the far north coast of New South Wales.

Following recent investigations overseas it was found that the correct name for the naturalised weed known as "Dwarf Mallow" is *Malva neglecta*, and *Malva rotundifolia*. The true *M. rotundifolia* is probably not present in New South Wales.

The correct name for the "French Flax", known formerly as *Linum gallicum*, was shown to be *Linum trigynum*. This should not be confused with the cultivated species *Reinwardtia indica*, once known as *Linum trigynum*.

Research continued on various groups of flowering plants including *Poa* (Gramineae), *Acacia*, especially the *A. Decurrens* group (Mimosae), *Eucalyptus* (Myrtaceae), *Xanthorrhoea* (Xanthorrhoeaceae) *Juncus* (Juncaceae), and various members of the families Leguminosae, Proteaceae and Chenopodiaceae. Amongst the Gymnosperms, *Macrozamia* (Cycadaceae) has received particular attention.

In the Pteridophyta, research was directed especially towards the genera *Lastreopsis*, *Acrostichum*, a number of species of the *Dryopteris decomposita* group, and the species *Dicksonia fibrosa*. Studies on certain tropical ferns are in progress.

Half of our collection of the algal genus *Codium* was revised and named by Dr. H. B. S. Womersley of the University of Adelaide.

Field studies were carried out on *Eucalyptus*, *Macrozamia*, *Juncas*, *Acacia*, *Utricularia*, *Poa*, *Dryopteris* and *Marsilea*. Areas visited were the Forbes-Parkes-Condobolin region, Bumberry, the New England district, Mt. Glorious and Lamington National Park, the Coff's Harbour, Clarence River, Richmond River and Tweed River districts, Charlestown near Newcastle, National Park near Sutherland and Centennial Park. Observations on natural hybridization were made in several difficult groups.

Publications.—One number of the "Contributions from the New South Wales National Herbarium" has been printed. This is Vol. 2, No. 5, containing a paper entitled "A revision of the genus *Callitris* Vent.", by Joy Garden. Another number, containing a paper, "A Review of the Family Oleaceae", by Miss L. A. S. Johnson, is in press.

Also in press is "A New Australian Species of *Lastreopsis*", by M. Tindale, to be published in Professor Robyns Anniversary number of the "Bull. Jardin Botanique de l'Etat, Bruxelles".

Death of Rev. H. M. R. Rupp.—With very deep regret, the death of Rev. H. M. R. Rupp, recognised as the authority on Australian orchids, is recorded. Until the time of his death, 2nd September, 1956, at the age of 84, Mr. Rupp had for many years been an honorary member of the botanical staff of this Herbarium, specialising in native orchids. He was author of a great number of papers, having published the original descriptions of three genera and 57 species of orchids, and of the volume, "Orchids of New South Wales", which is the first part of the new "Flora of New South Wales." He was awarded the Clarke Medal of the Royal Society of New South Wales and the Australian Natural History Medal of the Field Naturalists' Club of Victoria. His daughter, Mrs. L. G. Cox, of Armidale, New South Wales, has donated his botanical library, orchid photos and drawings to the National Herbarium, which has housed his extensive collection of specimens for many years.

Professional Visitors to the Herbarium.—Scientific workers from overseas and Australian institutions who visited the Herbarium to study and discuss relevant subjects included: Mr. L. J. Brass, world-famous plant collector of the American Museum of Natural History, New York; Miss Betsy Paterson, University of New England, studying *Acrotriche*; Miss Alison McCusker, University of New England, studying variations in *Lissanthe strigosa*; Professor Ronald Goode, of Hull, England, identifying specimens; Dr. H. J. Eichler, Keeper of the Adelaide Herbarium, studied our material of Ranunculaceae; Professor N. Beadle, University of New England; Dr. R. Pichi-Sermolli, of the University Herbarium, Florence, Italy; Dr. Isobel Cookson, Lecturer in Botany, University of Melbourne; Dr. P. Vermuelen, Hugo de Vries Laboratorium, Amsterdam, who studied native ground orchids and made a number of field collections; Mr. M. Gray, C.S.I.R.O., Canberra, Professor C. Wilson, Dartmouth College, New Hampshire, U.S.A., studying *Hibbertia* and making field collections; Mr. C. Chippendale, Animal Industry Branch, Alice Springs, Mr. N. Lotherian, Director, Botanic Gardens, Adelaide, and Mr. S. L. Everist, Government Botanist, Brisbane.

General.—Miss Vickery attended the A.N.Z.A.A.S. meeting at Dunedin, New Zealand, on special leave, and during subsequent recreation leave toured over 3,000 miles of both islands studying vegetation conditions, and visiting C.S.I.R.O. at Christchurch, and the Auckland Institute and Museum where she had discussions on taxonomic botany.

Lectures delivered by members of the staff include: Chief Botanist (6 and 1 T.V. appearance); Senior Botanist (4); Miss Vickery (1); Mr. Correy (2); Mr. Constable (6). Subjects included "Tree Planting", "Lawn Grasses", "Functions and History of the Botanic Gardens", "Home Garden Design", "Protected Wild Flowers" and "Plant Collecting". Audiences were various Horticultural Societies, Rotary Clubs, Junior Farmers' Clubs, Girl Guides Association, the Australian Museum Staff, the Rangers' League and Parks Superintendents' Conference. The Senior Botanist also gave a number of colour-illustrated talks on plant identification to the gardening staff.

A further 150 colour transparencies were made of native and exotic species in the Botanic Gardens, and of native species in the field. A number of duplicate transparencies, made from colour slides loaned by other botanists and collectors, were of great value in illustrating lectures and general enquiries at the Herbarium.

Apart from routine identifications of specimens submitted by the public and institutions, special identifications included: tropical species collected at Cook's landing sites on the east Queensland Coast by the Staff of the Australian Museum; a large number of tree-ferns from Norfolk Island, Lord Howe Island, and Australian species grown in California, Mauritius and Teneriffe for the Smithsonian Institution, Washington; extensive collections of native species made by Dr. Pichi-Sermolli, of Florence, Italy, Dr. P. Vermuelen, of Amsterdam, Holland, and Dr. H. J. Eichler, of the Adelaide Herbarium; a collection of Northern Territory grasses for the Wild Life Section of the C.S.I.R.O.; the pteridophyte herbarium of the University of New England; and ten ice-cones of Western Australian wild flowers exhibited at the R.A.S. Show.

The rumen contents of 60 head of stock were submitted from Glenfield Veterinary Research Station for the identification of plant parts.

The Chief Botanist and members of the botanical staff served on the following committees: Technical College Horticultural Advisory Committee, Remembrance Driveway Committee, Standing Committee on Trees and Forests of the Men on the Land Society, Muogomarra Trust, Royal Horticultural Society, and Linnean Society.

When necessary, a botanist accompanied an officer of the Department of Local Government on wild flower inspection in connection with the issuing of licenses for selling protected species.

THE DOMAINS

A bowling green, constructed in the Outer Domain behind Sydney Hospital by a pleasing co-operation of Government Departments and outside organisations, was officially opened on 3rd December, 1956, mainly for the use of pensioners and similar people.

Sixty new rose plants were set out by the Burns statue in the Outer Domain. 20 new seats were provided and special attention was given to the repairing and painting of seats throughout the Domain.

Existing pathways were repaired.

A new pathway was constructed by the City Council surrounding the area reserved for building the parking station. Parking in portion of the Outer Domain was again authorised for the Christmas shopping week.

The sporting areas were in great demand for various sports, the football competition attracting large lunch-time crowds.

Suitable areas were provided for special functions such as Anzac Day Services, Waratah Festival and for assembly sites for various marches.

CENTENNIAL PARK

The playing fields were freely used during the year, the Park being closed to vehicular traffic for some events. A new area was made available for flying model aircraft. Consideration was given to the development of the areas on the south-eastern section of the Park for playing areas.

The usual facilities were provided for the Royal Agricultural Society in connection with the Easter Show.

Extensive repairs were effected to the stormwater drainage systems by our staff plumbers, and many seats and fences were repaired and painted.

ADMIRALTY HOUSE AND GOVERNMENT HOUSE

These areas were maintained in good condition and arrangements were made for taking over the maintenance of the grounds at Kirribilli House.

An additional gardener and labourer were added to the staff for this purpose.

DIVISION OF MARKETING AND AGRICULTURAL ECONOMICS

State Marketing Bureau

Legislation.—The Marketing of Primary Products Act was amended during the year, principally for the purpose of making further provision for regulating the marketing of primary products covered by the Act. The Amendment Act clarifies the powers of marketing boards to make regulations for the marketing of commodities under their control.

The Amendment Act also:—

- (a) Extends the powers of marketing boards to enable them to act as agents in the marketing of products, which were produced outside the controlled area (e.g., interstate consignments).
- (b) Enables the Egg Marketing Board to make deductions from the proceeds of the sale of eggs, delivered to it during such pool periods as it may determine, for the purpose of making certain refunds to producers from whom deductions were made during the period July 1, 1951, to June 30, 1954, to meet the cost of erecting Board buildings. This amendment thus enables the Board more equitably to apportion among egg producers the costs incurred in erecting buildings.

Marketing Boards.—Producer-controlled marketing boards continuing to function under the provisions of the Marketing of Primary Products Act, 1927-56 are the Egg, Rice, Navy Bean, Wine Grapes, and French Bean Seed Marketing Boards. The Potato Marketing Board ceased to operate early in the year, following a dissolution poll held on June 29, 1956. Action to wind up the affairs of the Board is still proceeding.

Economic Research

Regulations governing the operations of marketing boards and payment of allowances to members were amended in several instances to provide:—

- (a) for increased sustenance allowances to members of all boards in accordance with increases made under Public Service Board Regulations;
- (b) for increased scale of allowances to the chairman and members of the Navy Bean Marketing Board, distinct from sustenance allowances;
- (c) that the Navy Bean Marketing Board shall meet not less than six times annually in lieu of once per month (for economy reasons);
- (d) for alterations to Egg Marketing Board Regulations covering grade standards for eggs;
- (e) for increased travelling allowances to members of certain boards for use of private cars (6d. to 10d. per mile). Action in this instance is not complete.

In particular, the Rice Marketing Board Regulations were amended by adding an additional Regulation to permit and cover sales of rice direct from producers to the Ricegrowers' Co-operative Mills Ltd., and the proclamation vesting rice in the Board was revoked. Ninety per cent. of rice production under Board control passes to the growers' own milling society and for such sales the Board will be the growers' agent. This change in the system of rice disposals was made to ensure continuance of income tax exemption. (The income of a co-operative society derived from purchases of commodities from members and distributed by way of rebate or dividend—provided 90 per cent. of income is derived from this source—is exempt from income tax. Until this amendment and revocation, all rice becomes the property of the Board on production).

Market Reports and Related Services.—The Division continued the collection, collation and publication of market information in accordance with the Marketing of Primary Products Act. Regular reports were issued on prices and supplies at the Sydney wholesale fruit, vegetable and flower markets, the poultry and fish markets, the produce markets at Alexandria and Sussex Street and the livestock markets (for cattle, sheep and pigs) at Homebush. Wholesale prices of carcase meat at Homebush Abattoirs were also collected and published.

Reports on local and overseas markets for grain, and details of the cold store stocks of butter, cheese and eggs were published weekly. Cold storage statistics for fruit and the average wholesale prices for a comprehensive range of fruit, vegetable, grain and livestock products were published each month.

Indexes of feed costs and related product prices continue to be compiled from statistical analyses of wholesale and retail stock feed prices collected monthly.

The daily collection of retail prices for fruit, vegetables and fish was continued. A survey was made of ninety metropolitan fruit and vegetable shops in order to place the selection of shops in the routine collection on a more representative basis. As a result the retail collection was revised and extended to include twenty-one metropolitan establishments. Analyses of variance of the prices collected during the survey period were also made; this work is being continued as a guide to whether the shops selected for routine collection are representative.

The Division continued to provide a daily market report for broadcasting over the A.B.C.'s national network. Similar information was supplied to newspapers and journals, many individual firms and other organisations, by the *Daily Wholesale Price Quotations* and the *Weekly Marketing Notes*.

Details of the arrival of primary produce into Sydney by rail and sea from New South Wales and interstate sources were recorded. The arrivals of certain products by road transport were also recorded and continued efforts were made to place the collection on as complete a basis as practicable.

The nature of enquiries concerning markets and market prospects and the wide variety of sources from which they emanated (e.g., Government Departments, banks, processors and trade agencies, as well as growers and growers' organisations) indicated the need for continued development of a market advisory service comprehending prospective as well as actual price and supply data. The Division was able to answer these queries effectively with the aid of graphs of seasonal price patterns, statistics of fruit trees by varieties and districts, a harvesting calendar for all main New South Wales crops and a detailed schedule for all main New South Wales crops and a detailed schedule showing the periods during which most commodities, classified by varieties and growing centres, are available on the Sydney markets.

Crop Reviews and Forecasts.—The Division's services relating to crop forecasting and crop reviews were curtailed to some extent during the year owing to staff shortages. It was decided at the end of 1956 to eliminate crop reviews entirely, and forecasts for maize and pome fruits will not be issued until there is a marked improvement in the staffing position.

Forecasts for the following crops were issued:—wheat, oats, broom millet, potatoes and citrus fruits. The basic data for these forecasts were supplied by district officers of the Department and a body of honorary crop correspondents.

Meteorological Services.—An officer of the Division again acted as Departmental representative on the State Climatological Committee and as liaison officer between the Department and the Sydney Weather Bureau. Extensive meteorological records were maintained and advice and data on farming pursuits were provided for the use of officers of the Department and members of the public and particularly in connection with the Division's crop forecasting services.

The Division also provided the necessary liaison between the Department and C.S.I.R.O. in attempts which C.S.I.R.O. made to produce rain during the latter part of the year, following the extremely dry conditions experienced throughout the State during the summer and autumn.

Research continued into a wide range of problems affecting the economics of the rural industries, including the marketing of agricultural produce, the economic structure of various industries and management problems on individual farms. Much of the work continued to be based on results obtained from detailed field surveys. However, the Division's research staff was reduced to a marked extent by the resignation early in the year of one officer who could not be replaced and the fact that several officers were on study leave.

The scope of the Division's research programme is illustrated by the various research projects completed during the year or in progress at the end of the year. These are listed below.

Survey of Grazing Properties in the South-west Slopes.—Analysis and publication of all material obtained from this survey, which was referred to in some detail in the last report, was completed during the year. This was a particularly comprehensive survey involving 150 representative grazing properties in the South-west Slopes.

Two final articles based on this survey, one dealing with stocking rates and the other with extension services provided to the grazier and their effectiveness, were published in the *Review of Marketing and Agricultural Economics*.

Survey of Small Dairy Farms on the Far North Coast.—Previous surveys have indicated that the highest cost producers in the dairying industry are generally small farms with a very limited output. Therefore, a survey was made of seventy-five small dairy farms in the Tweed, Richmond and Clarence Valleys. The survey aimed to pin point ways and means by which the farmers could improve their efficiency and make adjustments to the less favourable economic conditions at present being experienced in the dairying industry. The analysis of the material obtained had not been completed at the end of the year.

Economics of Pasture Improvement.—A detailed study of the financial benefits and costs of pasture improvement on southern wheat-sheep farms was made and the results were published in the *Review of Marketing and Agricultural Economics*. An assessment of the profitability of pasture improvement under given conditions showed that, even with the relatively low wool prices which ruled in 1955-56, pasture improvement was a very profitable investment. For example, it was shown that it would result in an increase in net income of approximately 80 to 100 per cent. on a mixed wheat-sheep farm of 900 acres. The study also indicated that pasture improvement would remain a profitable investment unless wool prices fell to less than 2s. 6d. per lb. However, the report emphasises that pasture improvement is a long-term investment and even with the relatively favourable wool prices which ruled in 1956-57 it would take about eight to ten years before returns from a continuous pasture improvement programme exceeded the costs of development.

Wide publicity given to the information provided by this study resulted in numerous requests for officers of the Division to address groups of farmers. It has also been used by various financial institutions, including the newly-established Rural Liaison Service of the Commonwealth Bank of Australia, to provide background information for bankers and others associated with the financing of the rural industries.

Survey of Farm Development and Fertiliser Requirements.—Following a request from Australian Fertilisers Pty. Ltd., a large-scale survey involving 500 farms in the Slopes, Tablelands and the Riverina is being made in an attempt to assess likely future demands for superphosphate. Information will be obtained from farmers on likely sowing of improved pastures in future years and of farmers' development plans generally. When analysed, this information should be of considerable value not only to research and extension officers of this Department but to other State and Federal instrumentalities and to private firms concerned with the rural industries.

The survey represents a departure from all previous surveys made by the Division in that all field interviewing is being carried out by officers of Australian Fertilisers Pty. Ltd. on behalf of the Department. This, of course, greatly reduces the call on the Division's staff. It would, in fact, have been quite impossible at this stage to carry out the survey in the absence of such an arrangement.

Productivity and Efficiency in the Dairy Industry.—A study was made of long-term trends in dairying relating to both production and marketing. No previous attempt has been made to estimate long-term trends in labour productivity in the dairy industry in Australia, largely because of the statistical difficulties involved. However, the fact that this country must plan for a very considerable but selective expansion of agricultural production and that the place of dairying in this expansion is open to challenge means that some knowledge of productivity trends in the industry is necessary. Among the more important findings were:—

- (a) Despite a rapid increase in recent years, it seems likely that output per man in Australian dairying has failed to improve markedly on the level of the early thirties. By contrast, output per man over the rest of Australian agriculture is now nearly 60 per cent. higher than in the 1931-35 period. Over roughly the same period, output per unit of labour in New Zealand dairying nearly doubled.
- (b) The relative lack of progress in output per man in Australian dairying has important implications for dairymen, consumers and taxpayers. Incomes in dairying have risen substantially, but remain relatively low. This rise in incomes has been obtained largely at the expense of consumers, whereas higher incomes in the rest of Australian agriculture have been achieved mainly through increased productivity. The industry has been largely shielded from the repercussions of higher retail prices by the use of a consumer subsidy on butter and cheese.
- (c) In an economic sense the industry is over-manned. Moreover, its labour force has been expanding while the manpower engaged in more efficient primary industries has been falling.

Southern Tablelands Regional Research and Assessment Study.—A very comprehensive study was commenced during the year of grazing properties in the Yass River Valley. This study is being carried out in co-operation with C.S.I.R.O. and the South Coast and Tablelands Agricultural Regional Committee, both of which, independently had stressed the need for an economic survey of the area.

Part of a wider project which represents a new approach to agricultural research in Australia, the survey is being directed by a Joint Planning Committee representing C.S.I.R.O., the South Coast Tableland Agricultural Region, the Division of Plant Industry and the Division of Marketing and Agricultural Economics. It provides for an intensive study of a relatively small area by a considerable number of specialists including agronomists, soil scientists, hydrologists, plant ecologists, veterinary scientists and agricultural economists. The initial farm survey, for which this Division is fully responsible, has been planned to cover 150 grazing properties in the Yass Valley. Field work was still in progress at the end of the year.

Other Research Projects.—A number of other research projects was carried out, but several projects mentioned in the previous report had to be discontinued or postponed owing to shortage of professional staff. These included: the survey on the economic organisation of the beef cattle industry; statistical analysis of seasonal price trends for fruit, vegetables and livestock; research into crop forecasting methods. Work on economic case studies of selected dairy farms had also to be limited severely. It has not been possible to introduce the Farm Management Service referred to in last year's report.

A close scrutiny of the rural credit position has been maintained and there has been close co-operation with the newly-established Rural Liaison Service of the Commonwealth Bank, which may well prove a most important development affecting rural credit facilities in Australia. The Division was consulted on the proposal to establish the service.

Advisory, Educational Extension

Advice on matters of economic policy affecting agriculture continues to be given. The Division also has continued to assess the supply-demand position for farm machinery and all basic rural industry materials, including building materials, fertilisers and high protein feeds and to provide advice on the export of high protein feeds.

Officers of the Division again have addressed numerous Departmental schools for farmers, conventions and meetings organised by the Agricultural Bureau, the New England University, professional societies and other bodies on many aspects of rural economics.

They were also closely associated during the year with the establishment of an Australian Society of Agricultural Economists and arranged publication of Proceedings of the First Conference of Agricultural Economists held in Australia in the *Review of Marketing and Agricultural Economics*.

Being responsible for examining in this subject at both colleges, the Division continued to provide a lecturer in Agricultural Economics at Wagga Wagga Agricultural College and assistance has also been provided to the lecturer at Hawkesbury Agricultural College.

At the request of the Professor of Agricultural Economics at Sydney University, Mr. F. H. Gruen gave a course of twenty-seven lectures to students of Agricultural Economics in the Faculty of Agriculture.

Colombo Plan Students.—The Division again assisted Colombo Plan Students with courses of study, but the volume of work was much smaller than for a number of years past.

Publications.—Publication of all major divisional periodicals has been continued. Only three issues of *Review of Marketing and Agricultural Economics* were published instead of the usual four, partly because the reduced professional staff experienced difficulty in maintaining a sufficient output of suitable material and partly because, by special arrangement, it was agreed that the Division would publish the Proceedings of the First Conference of Agricultural Economists held in Australia. This was considered by the Government Printer to be too substantial for one normal issue; the March and June, 1957, issues were therefore combined in one issue. *Weekly Marketing Notes* and the monthly review, *Grass Conditions and Pastoral Outlook* continued unchanged and the monthly, *Report on Production Trends*, in slightly modified form, made necessary by staff position.

A survey of addresses on the mailing list indicated that the *Quarterly Review of Honey Flow Prospects* was of limited value and because of the acute staffing difficulties this publication has been discontinued temporarily.

The reduced professional staff could not maintain regular contributions to the Department's *Agricultural Gazette* and only four contributions were made during the year, but officers contributed articles to journals and newspapers from time to time.

During the year, mailing lists for all important divisional publications were completely revised, this affecting a considerable saving in stationery and postage.

Representation at Conferences and on Committees.—The Chief of Division continued as the Department's representative on the State Nutrition Committee and as one of its representatives on the Irrigation Development and Food Production Advisory Committee. He is also a member of the Markets Investigation Committee which was revived recently to consider proposed transfer of the City Markets to another site.

The Principal Economics Research Officer was one of the Department's two representatives on the Expert Committee appointed by the Minister for Conservation to study horticultural losses on the M.I.A. and the Division's representative on the Joint Planning Committee for the Regional Research and Assessment Study of the Southern Tablelands. He also continued as Executive Officer of the State FAO Committee.

The Division continued to be represented on the City Markets Advisory Committee.

DIVISION OF INFORMATION SERVICES

A communication from the Public Service Board dated 24th April, 1957, informed the Department of a pending change of name to "Division of Information Services".

The Division contributes the following services—editing; inquiry-counter and distribution of publications; library; radio; photographic, filming and film-library; display art/designing; Agricultural Bureau organisation; women's service. It is

responsible also for the development, acquisition and maintenance of extension aids, their decentralisation to field offices of the Department, and the promotion of interests and skills of subject-matter officers in using extension aids. In this regard it organises and provides the staff for in-service extension methods training schools, as well as day-to-day tutorial advice on extension service/methods.

Editing Section

The section maintained production of the monthly journal *The Agricultural Gazette of N.S.W.*, the monthly *Poultry Notes*, the bi-monthly *Dairy Topics* (formerly *The Herd Recorders' Letter*), the weekly *Press Copy*; booklets, pamphlets, leaflets within the range of approximately 700 titles, and special handbooks such as for short-term schools.

The Agricultural Gazette of N.S.W.—Circulation of the monthly (96 pp., illus., incl. 43 pp. adverts., colour cover) increased from 31,100 to 32,000. Advertising revenue is reported as £11,895, for Gazette space, compared to £9,100 in 1955-56, the higher rates introduced in 1955-56 having effected the increase.

Poultry Notes.—This monthly, most issues of which have appeared also in the Gazette, has a circulation of 6,300.

Dairy Topics.—Financed by the Dairy Industry Extension Grant, this bi-monthly has a circulation of 18,100; an increase of approximately 100 over the previous year. Two years ago, circulation was only 2,100. Until 1955-56 distribution was confined mainly to herd-recording farmers. Since January, 1956, it has been posted direct by the Printer to all dairy farmers.

Press Copy.—Circulation of this weekly is now 1,150. Primarily, of course, it is published for use by newspapers and radio stations. There are about 300 newspapers and radio stations on the mailing list. Some 596 items were published in this year's fifty-two issues. At least one item of women's interest or farm home interest appeared in forty-five of the fifty-two issues.

Stereo Loans.—Loans to newspapers of stereos of blocks used in *Press Copy*, totalled 351. The 1955-56 total was 620, and the 1954-55 total was 394. In 1955-56 the total was helped by systematic promotion of the use of stereos illustrating livestock purchased overseas by the Minister's Stud Stock Buying Delegation.

Roneoed Press Releases.—To 30th June, 1957, 195 statements, mainly from the Ministerial office, were stencilled, roneoed, and despatched to newspapers, radio stations, and others. Approximately 52,242 copies, from the 195 titles, were assembled and despatched. In 1955-56 there were 162 statements, and in 1954-55 there were 195.

Booklets, Pamphlets, Leaflets.—A total of 165 publications was edited and sent to the Printer, and 188 were received from the Printer. In 1955-56, 131 were sent to the Printer and eighty-one were received, the eighty-one including many submitted in 1954-55.

Farmers' Handbook Volumes.—The 1955-56 report recorded that the "Weeds Volume", likely to comprise 400 pages, had been completed and was with the Printer, and that the "Pastures Volume" was in preparation. The position now is as follows:—

"Weeds Volume" galley-proofs were received late in 1956 and checked, over a period of several weeks, with appropriate technical officers. In April, 1957, they were returned to the Printer for a second set of galley proofs.

Writing of the "Pastures Volume" has progressed to the point of completion of Chapter VII. Five chapters were reported complete in 1955-56, but it was necessary to add to them. Chapters VI ("Pastures Under Irrigation") and VII ("Pasture Management") are a lengthy total. There will be eleven chapters in the completed volume.

Inquiry Counter and Publications Distribution Section

Inquiries.—Total of 'phone, postal, and at-counter inquiries, excluding those personally handled by the Home Garden Inquiry Officer (see later), was 92,986; there were 84,954 in 1955-56. In 1954-55 the total was 161,763 and in the 1955-56 report attention was drawn to a downwards trend—and the probable explanation: It now seems likely that the position has stabilised. Totals of publications distributed (see later) support that inference.

Inquiries	1954-55	1955-56	1956-57
Telephoned	37,346	23,190	19,745
Postal	43,658	22,969	22,639
*At counter	80,759	38,826	50,602
Totals	161,763	84,985	92,986

* Excluding inquiries at the Department's R.A.S. Show Information Counter, for which records were not kept.

Publication Distribution.—Free publications totalling 940,379 were distributed, including 83,619 to Regional and district offices of the Department. The 1955-56 and the 1954-55 totals, respectively, were 800,218 and 969,407. Sale publications totalled 3,571 as against 4,080 in 1955-56.

Sales of "The Home Vegetable Garden" booklet could not be expected to remain at former high levels, and this largely accounts for the lower sales total. The sales total of "The Home Vegetable Garden", 3,063, does not include sales made direct by the Government Printing Office.

The 1955-56 report speculated on the effect of country offices on the Farrer Place (I. and E.S.) inquiry and publication distribution totals. Continuation of the several years' statistics presented in that report suggests that the trend has stabilised:—

Year	Inquiries	Publication Distribution
1950-51	59,721	198,473
1951-52	107,739	798,311
1952-53	215,819	1,516,562
1953-54	188,352	1,500,867
1954-55	161,763	965,407
1955-56	84,985	800,218
1956-57	87,687	940,379

Home Garden Inquiry Officer's Contributions.—The Home Garden Inquiry Officer maintains a separate statistical record of his activities. The aim is to measure the volume of such inquiries which would in his absence be referred to subject-matter officers in other Divisions or Branches, with consequent disruption of their attention to bona-fide farm problems. It is not implied that the Home Garden Inquiry Officer's statistics include all home garden inquiries. Many are simply handled by the office assistants in the section drawing relevant publications from stock.

Inquiries handled by the H.G.I.O.	1955-56.	1956-57.
Telephone	1,050	2,927
Postal	950	932
At counter	2,000	4,353
Total	4,000	8,212

The officer's response to the 8,212 inquiries included distribution of 13,000 publications. This total could have been much greater if the Department had a wider range of publications on floriculture and allied subjects. This lack, however, is being overcome, initially through roneoed sheets of which he is the author, and through his quarterly garden notes and flower sowing and planting guides published in *The Agricultural Gazette*.

Regional Publicity Officers

The publicity officers attached to Regional offices of the Department have increased from four to seven, through the inauguration of three new Regions—South-western (Leeton), Northern (Tamworth), and Mid-Coast and Hunter (Maitland). Their activities are reported by the Acting Chief of the Division of Regional Extension Services established as from 23rd April, 1957. The publicity officers have been transferred to that new Division.

Library Services

The Department's library services, excluding office assistants, are staffed by eight officers seconded to this Department by the N.S.W. Principal Librarian.

Effect of Staffing Branch Libraries.—The Department's central librarian found it possible to retain only one assistant full-time in the central library this year. Another has been part-time in the central library and part-time in the Chemist Branch and Plant Industry Division branch libraries. Another has been part-time in the central library and part-time in the Division of Marketing and Agricultural Economics branch library; another has been part-time respectively in

Entomological Branch, Biological Branch, and Dairying Division branch libraries; another has been part-time respectively in Animal Industry Division, Glenfield Veterinary Research Station, and National Herbarium branch libraries; another has been full-time in Hawkesbury Agricultural College branch library. Other branch libraries have not yet had personal attention by the professional librarian establishment.

The branch libraries which have been receiving their attention are showing definite effects. The resources are gradually being checked and re-listed and standard library methods are increasingly apparent. One beneficial effect of the systematic re-listing in the various branches is the making of resources available to all officers of the Department in lieu of only to officers in a particular section.

Further, relatively junior library staff have in effect released for other work the time of subject-matter officers.

Library Accessions.—Items totalling 13,072 (books, periodicals, bulletins, reports, etc.) were received from sources throughout the world, compared with 10,082 items in 1955-56 and 11,185 in 1954-55. New books totalled 277 compared with 309 in 1955-56 and 289 in 1954-55.

These accession figures do not include books acquired by means of Agricultural Extension Grant funds (A.E.G. Project 213—"Development of Libraries' Facilities for Extension Service"). The A.E.G. Project yielded a further ninety-two books for country offices of the Department. Some 1,076 books, in fifty-one country offices, have now been acquired by that means.

Central Library Loans.—Loans were made of 28,680 items of literature, compared to 21,501 items in 1955-56 and 18,352 in 1954-55. The 28,680 items consisted of 22,901 to officers in regular circulation lists, and 5,779 miscellaneous loans (individual special requests not associated with regular circulations). The overall, approximate 25 per cent. gain in the loans figure is significant illustration of the increasing use of the Department's library resources by research and extension personnel.

Weekly despatch rate to country offices ranged up to 500 items and averaged more than 400 items per week.

Photo-copying Service.—The photo-copying units (multiple and single) acquired by means of Agricultural Extension Grant funds are now being used regularly. An office-assistant to specialise in the service commenced duties in November, 1956. The service has been allowed to grow at a natural rate, without special publicising. It is proving increasingly useful, particularly to country officers. From 7th December, 1956, to 30th June, 1957, 174 photo-copying assignments involving 1,353 pages were requested and completed. The photo-copying office assistant engages in 16-mm. cine-film checking and repair work in the film library, and miscellaneous assistance to the photographic aids section, when not pressed by photo-copying demands.

Bi-monthly Accession Circulars.—At bi-monthly intervals a classified "Selected List of Publications", compiled by the Librarian from the total of accessions in the preceding period, has been roneoed, and despatched to 320 addresses in the Department of Agriculture and closely allied establishments.

Increased Reference Work.—Subject bibliographies of extensive nature have been prepared by the central librarian at the request of Regional and district officers, an encouraging indication of the increasing contributions made by the library resources to the Department's effectiveness.

Other Institutions' Use of the Library.—Loans to other Departments and bodies, including the C.S.I.R.O. and the Universities, and the use of the library by the public and by officers of commercial organisations, have increased.

Display Artist-Designing Services

Of the two Display Artist-Designer positions, one a temporary position financed by the Dairy Industry Extension Grant, the State position has been vacant since June, 1955. In the interim, officers of other sections of the Division have at every opportunity assisted the display section manually.

Show Exhibits and Other Displays.—The Department's annual display and information bureau at the Royal Agricultural Society's Easter Show was the major undertaking. For 1957 the subjects of this display were citrus gall wasp, other fruit tree pests and diseases, pasture improvement, and a cross-section of the Department's research and extension activities. Response by the public, urban and rural, at the information

counter, was satisfying proof of the good public relations effected by the display. An apicultural display elsewhere in the R.A.S. grounds, by the Principal Livestock Officer (Apiculture), and a "Weed Control by Chemicals" display, by the Special Agronomist (Weeds), were also assisted by the Display Artist-designer; mainly through sign- and ticket-writing.

At the 1956 Sheep Show in the R.A.S. grounds, a pasture nutrition display promoted by the Division of Plant Industry and Chemist Branch, was assisted by the Display Artist-Designer. Other show efforts by Departmental officers in rural areas (to which the Display Artist was able to assist either by advice, or sign- and ticket-writing, or production of some components, or assembly, or loan of equipment such as propomats for 35-mm. slides) were at Orange, Bathurst, Macksville, Maclean, Mullumbimby, Grafton and Wagga Wagga.

Some special displays, not associated with agricultural shows, to which the Display Artist lent assistance were the Agricultural Careers exhibits in Sydney by the Public Service Board and, separately, by the Australian Institute of Agricultural Science, and at Bathurst by the local Agricultural Education Committee.

Field Day and Demonstration Project Signs.—Signs, some for temporary and others for permanent mounting at appropriate sites, were executed for field officers in various districts. In some cases only the design and specifications were drafted, the work then being submitted to Prisons Department to complete.

Lecture and Demonstration Aids, Charts.—Aids and charts conceived by subject-matter officers of other Divisions for use in talks or demonstrations to farmers at meetings or field days have been prepared on demand.

Display in Publications.—A heavy demand by the editing section for assistance in display work for publications has been met in part. The assistance has included cover-designs and artwork, finished artwork in colour, line, line and tone, and tones, photograph retouchings, diagrammatic illustrations, graphs, and maps. It was necessary to send some publications to the Printer without the desired display work or with less than was needed; so reflecting the half-strength position in this section.

Photographic Aids Services—Cine and Still

Field Officers 35-mm. Photography.—A total of 4,340 colour and 4,530 black-and-white slides were returned to country offices, with tutorial comment on camera skill. The lower totals compared to the 5,250 colour and 6,060 black-and-white in 1955-56 reflect the cumulative effect of the slide collections being built up in country offices. Selection of subject matter, and general quality are improving.

Tutorial Letters.—A total of 560 letters of advice on photographic technique were forwarded to country offices. These included responses to such special requests as for the use of supplementary lenses for macrophotography, flashlights for interior shots, etc. Requests by field officers, in regard to application of special photographic techniques are increasing.

Central Photographic Library.—The Division's photographic library has grown by 468 new titles. It now has 2,108 negatives, largely selected from field officers' films. The library is becoming better-known. Among requests from other organisations seeking assistance were several by the Department of Education's Visual Aids Centre at Burwood, for series of photographs for school film-strips. The Australian Broadcasting Commission selected thirty-three from library negatives with a view to enlargement for television use, and the A.B.C. now expects to be a regular client. These prints were charged at 10s. each.

Print Service.—Prints totalling 1,786 (6 in. x 4 in. and 8 in. x 6 in.) were supplied to illustrate the Gazette, other publications, officers' reports, for enlargements for show displays, and for Division of Dairying cattle records.

Photographic enlargements selected for show displays and exhibits were used at the Royal Agricultural Society Easter Show, the Grafton, Orange, Bathurst and Bega Shows, in Kiama Festival Week, and in the two Careers Exhibits in Sydney, and at Bathurst.

35 mm. Slide Series.—Slide series were supplied for the R.A.S. and other Shows, for the Careers Exhibits and various rural towns, Festival Weeks. Seventeen entomological drawings were photographed in colour and sets of this series were distributed to Entomological Branch, to Hawkesbury and Wagga Agricultural Colleges.

Photographic Assignments.—Special assignments undertaken by the section involving particular techniques including photographing of fruit specimens showing certain symptoms, wheat varieties for identification characters, grape leaves showing disease or nutritional deficiency symptoms, weed species seed heads, and kindred subjects.

Pre-Acquisition Advice on Equipment.—Advice was given to the Board of Tick Control, Grain Elevators Office, Division of Plant Industry, Biological Branch, Entomological Branch, Export and Import Branch, and to Central Administration offices handling relevant requisitions, prior to their acquisition of photographic and photo-copying equipment.

16 mm. Cine Film Production.—Conferences on proposed "Farm Machinery Maintenance" and "Yass Valley Survey" films were attended in an advisory capacity. Data for proposed "Poultry Nutritional Diseases" films have been obtained, with a view to producing scripts on which tenders for contract production of the films may be requisitioned.

16 mm. Cine Film Library Service.—All films were reassessed to determine possible withdrawals or amendments in the catalogue descriptions, in the light of outdated subject matter or wear and tear on the prints. Twenty-three Australian Diaries were withdrawn because of out-dated subject matter or poor physical condition. A new catalogue was compiled and issued, replacing the 1952 edition and its eighteen supplements. There are now 191 titles in the film library.

Some 1,179 individual films were loaned, in 370 programmes collated, compared with 806 film loans in 300 programmes in 1955-56. The rate of borrowings rose sharply after the new catalogue was issued in February, 1956.

Film checking and repairing continue to make heavy demands. Some 1,700,000 feet of film have been checked and, where needed, repaired.

Film Appraisal Screenings.—The Division organised twenty-four appraisal screenings, compared with nineteen in 1955-56, for appropriate groups of Departmental subject-matter officers, to determine the value or otherwise of particular films in extension service.

Radio in Extension Service

An important phase of the duties of the extension officer (Radio) is tutorial service for field officers. Travel funds were very limited this year. The officer visited twenty-three

towns where officers have opportunities to exploit radio or recording equipment as extension aids with either a local or not-too-distant radio station.

He spent thirty-four days in towns where Departmental officers have a tape-recorder. On these visits he made contact with and gave tutorial assistance to fifty-seven field officers. Of thirty-five officers in residence at the 1957 Extension Methods School at Newport some twenty-seven had not been contacted by him in the field. Thus he has had tutorial contact with a total of eighty-four field officers in 1956-57. The tutorial service comprises advice on tape-recorder operation and minor servicing, recording techniques, radio interviewing, and varied programming ideas.

Tape Recordings Library.—The principle applied to the recordings library is that whilst there should be and is a central pool of tape-recordings featuring head-office specialists' subject matter, and that of others, those recordings are intended only to supplement field officers' radio efforts. The quantity of such recordings, therefore, should not be so large as to crowd out the "locality" items on rural radio stations' farm programmes. In that light, the Extension Officer (Radio) made fifty-nine recordings at head-office with subject-matter specialists, and forty-three recordings in the field. Many more would have been made but for the foregoing principle.

Forty-four of the fifty-nine recordings at head-office were made between 29th September and 30th November, 1956. The rate of call on these by field officers prompted an immediate curtailment. Several copies of a number of the original tape-recordings had to be made to cope with the heavy demand. This allowed loan of 198 tapes to field officers. Some recordings were broadcast by as many as fifteen radio stations. Broadcast recordings borrowed from the library by field officers exceeded 300.

Stations Broadcasting Farm Sessions.—There are now twenty-five radio stations reported to be broadcasting regular farm sessions to which field officers systematically contribute in person and/or by tape recordings. The stations are:—2CR and 2GZ Orange, 2WG Wagga, and 2CO Corowa, 2GN Goulburn, 2CY Canberra, 2BA Bega, 2NU Tamworth, 2NA Newcastle, 2HD Newcastle, 2NR and 2GF Grafton, 2PK Parkes, 2DU Dubbo, 2MG Mudgee, 2LT Lithgow, 2BS Bathurst, 2W1 Wollongong, 2LM Lismore, 2MW Murwillumbah, 2AD Armidale, 2QN Deniliquin, 2XL Cooma, and 2RG Griffith.

Other stations with farm sessions, to which field officers contribute intermittently, are:—2MO Gunnedah, 2BE Bega, 2LF Young, 2AY Albury, 2KM Kempsey, 2RE Taree.



Junior Farmers Learn Leadership

The Department's extension activities are not limited solely to agriculture. These students at a Leadership School at Evans Head are absorbing principles and ideas, from lectures by staff of the Agricultural Bureau, which will enable them to play a leading part in community affairs when they return home.

(Photo. from Division of Information Services.)

Additional Audio Aids Equipment.—The professional-quality tape-recorder added to head office equipment in 1955-56, and the recording-room constructed by Divisional officers from salvaged canite and timber, etc., have made it possible to produce recordings of professional standard. Four professional-quality tape-recorders have now been issued to Regional offices at Wagga, Lismore, Orange and Goulburn. Their former recorders, of lesser quality, are still held there as supplementary equipment. Similarly, professional-quality recorders are on order for the Regional offices at Leeton, Tamworth and Maitland. Numerous items such as tapes, spools splicing tape, adaptors, drive-belts, packing boxes and cases, and valves, have been issued to maintain the services in the twenty-three towns where officers have tape-recorders.

Forty-two lapel microphone units were also acquired and distributed. These are mainly for use in the field with field officers' systems when the officers are using their hands to demonstrate methods, etc.

Television "Workshop".—The extension Officer (Radio), Photographic Aids Officer, Display Artist/Designer, Assistant Organiser of the Agricultural Bureau, and certain other officers of the Division who attended part-time, attended a five days "workshop" in rural television, promoted by the Australian Broadcasting Commission's Rural Section in August, 1956. The Assistant Organiser of the Agricultural Bureau also spent some five weeks with B.B.C. television specialists early in 1956 after his period with the National Agricultural Advisory Service of England and Wales.

Their experiences at the "workshop" have led to a conviction that the Division has the range of personnel and equipment necessary to make successful presentations for television use, in very short cine films incorporating some art-work, lecture aids specimens, field activities. When funds are available for the raw film and the processing this conviction will be on trial.

The Agricultural Bureau of New South Wales

Active Units of the Agricultural Bureau.—Total of branches, district councils and Divisional councils in the mailing list is now 222, compared to 209 in the previous year. The net increase was brought about by inauguration of eleven new branches, renewal of activity in a former branch, formation of two new Divisional councils and one new district council, and disbandment of two inactive branches. Affiliation of branches with the Advisory Council continued to increase. This year 111 branches paid affiliation fees, compared to ninety-four in 1955-56.

Advisory Council.—Sixteen of the nineteen Divisions were represented in the Advisory Council. Divisions not represented, owing to insufficient local activity, were Central Murray, Illawarra, and New England.

The sixteen Divisional Advisory Councillors, the two women councillors, the State President, and Past President, comprised an Advisory Council of twenty. The Council met four times, and attendances averaged seventy per cent. of the membership.

Mr. E. J. Phillips of Piallaway, former Advisory Councillor for Namoi Division, was elected State President at the 1956 Congress.

The 1956 Congress (the 32nd) in July, at Hawkesbury Agricultural College, provided as usual three days and nights of educational talks, demonstrations and discussions, attended by about 300 men and women delegates and visitors, including some 230 in residence. His Excellency the Governor of New South Wales opened the Congress.

The Advisory Council was represented during the year in the N.S.W. Bush Nursing Association, the Primary Producers' Council of N.S.W., the Good Neighbour Council, the State Council of Junior Farm Clubs, the milk Zone Dairy Farm Advisory Committee, and at particular functions of the Country Women's Association of N.S.W.

An Agricultural Bureau Scholarship (now £110 p.a.) for a student at Hawkesbury Agricultural College was continued by the Advisory Council. A trophy (five guineas value) was again donated to the Junior Farmer Clubs of N.S.W. for the Maize Growing Championship.

Business discussed and acted upon by the Advisory Council included co-ordination of branch activities; use of University Extension Board lecturers; animal husbandry and agriculture short-term schools, week-end schools on specific subjects and

organisation of lectures in series for branches; small rural schools' problems; promotion of leadership schools; wider range of activities for women members; the Beef Cattle Breeders' Competition; long-term finance for farm development legume inoculation problems; fruit fly control; etc.

Two Leadership Schools were sponsored by the Advisory Council through the Division of Information and Extension Services, one at Newport in the summer for rural women and one at Hawkesbury College, in the winter vacation, for rural men. Each was successful.

Divisional Conventions, Field Days.—Ten Divisional Conventions and/or field days were promoted. The programmes reflected the increasing technical complexity of information sought by Agricultural Bureau members.

Central Coast Divisions' Convention at Cooranbong drew an attendance of 100, despite inclement weather. **Cumberland** substituted a Convention at Arcadia for the Annual Machinery Field Day typical of this Division for some ten years past, and drew an attendance of 200. **Lachlan Convention** at Woodstock comprised a two-days' programme, including field sessions, and 250 attended. **Macquarie**, at Wongarbone, also promoted a two days' programme, with field sessions, and drew 250 people. **Mitchell Convention**, at Running Stream, brought 250 people together. **Namoi** organised its first Convention for several years, and held it at Wallabadah where some 180 attended. **Richmond-Tweed Convention** was the first in the far north coast section of the Bureau in post-war years, and the two-days' programme at Kyogle attracted 160 farm people. **South Coast and Monaro Convention** at Dalgety drew 120 for the two-days' programme, including field sessions. **Upper Hunter Convention** at Warkworth, despite drought effects on herd management and production in this milk-zone area, drew attendance of 90 farmers.

Bureau Branch Activities.—Many of the branches now prepare a 12-months' programme of activities and work to it, delegating responsibility, within branch membership, for the specific functions comprising the programme. Organisation of field days continues to be one of the more spectacular contributions by the branches to the Department's extension effectiveness. Typical number of field days organised by the branches is 300 in a year. Less noted, because less publicised, are the regular meetings of the branches, ranging up to twelve per branch per year, for lectures, talks, discussion groups, 16-mm. cine film and 35-mm. slide evenings; in total a very big contribution to the Department's and other organisations' extension effectiveness.

Short-term Schools.—The two Leadership Schools conducted for the Agricultural Bureau, one at Newport, for women, and one at Hawkesbury College, for men, were concerned with meeting procedures, chairmanship, secretaryship, programming group activities, delegation and acceptance of responsibilities within a group, public speaking, Press writing for publicity, debating, play-readings, use of cine and "still" film projectors, field day organisation, and kindred useful group practices.

An Animal Husbandry and Agriculture School was promoted by Mitchell Divisional Council of the Agricultural Bureau in collaboration with Western Regional office of the Department of Agriculture. It was held at Bathurst and was an outstanding success.

Triennial Conference of Associated Country Women of the World.—Three women representing the Agricultural Bureau of N.S.W., including the Department's Senior Extension Officer (Women's Service), were to have attended the Conference in Ceylon in December, 1956. When it was postponed to July, 1957, two of the representatives withdrew. Miss M. Mould of Berridale branch of the Bureau will now be the only representative.

Bureau Women Members' Interests.—The Advisory Council has suggested to branches throughout the State that "to stimulate a wider range and more frequent educational activities for women in the branches, each branch should appoint a woman member to be responsible for assuring that activity suggestions, for women, received in information circulars and other literature, etc., shall be noted and adequately considered".

Beef Cattle Breeders' Competition.—The fifth Competition was conducted, again in collaboration with the Rural Bank of N.S.W. Designed to encourage improvement of small beef cattle herds and beef cattle raising on mixed farms, it is rated one of the outstanding rural competitions in this State. As many field days as possible are associated with the locality and district judgings leading up to the State placings. The 1957 competition is reported to have been the most successful of the five so far conducted.

Agricultural Bureau Booklet.—An attractive booklet has now been published by the Department, with colour cover and pleasant layout and illustration of subject matter, on the aims and activities of the Agricultural Bureau. The Rural Bank of N.S.W. donated the cost of the colour blocks for the cover.

Women's Extension Service

The sectional staff is comprised of one officer, designated Senior Extension Officer, but, through good liaison with resources outside the Department, contributes to the Department's effectiveness far beyond the limits which might be inferred from the numerical status.

Organising Assistance.—The Senior Extension Officer (Women's Service) assisted as usual in organising women's sessions for field days, conventions, the State Congress, and branch meetings in the Agricultural Bureau, and similarly assisted departmentally-organised field days including some held at experiment farms. Suggestions for women's sessions and names of speakers and demonstrators have also been given to the Junior Farmer Clubs, the Country Women's Association, and the Farmers and Settlers Association.

Talks, Demonstrations.—The Senior Extension Officer (Women's Service) personally contributed talks and/or demonstrations on twenty-two occasions in rural areas, the same total as in 1955-56. Additional talks were delivered to groups in the Sydney area, including the Sydney Technical College students in a food and nutrition diploma course. Similarly, her talks and demonstrations at two Leadership Schools promoted for the Agricultural Bureau, and at the three Extension Service Methods Schools promoted for departmental officers and for University of Sydney (2nd year Agric.) and Wagga Agricultural College (1st year) students, have not been included in the fore-mentioned twenty-two occasions.

Press Copy and Journal Activities.—Forty-five of the year's fifty-two weekly sheets of *Press Copy* included an article of women's interest. Some indication of the extent of their use by newspapers is provided by 450 press cuttings which have come to notice. An analysis of the 450 showed a range of from three to twenty-two occasions of use per article, and an average of eleven newspapers' use per article. Interstate newspapers and radio stations are also using them. Letters by individuals in other States have shown that to be so.

Thirteen articles of women's or farm home interest have been printed in "The Agricultural Gazette of N.S.W." in 1956-57, either contributed by the Senior Extension Officer or acquired by her from external sources willing to assist the Department's service for rural women. An article by this officer was also contributed to the "Business and Professional Women's Journal".

Notes for radio sessions of women's interest, also Press releases and discussion papers have been provided for the "Inlanders Branch, Country Women's Association of the Air—Western Australia" for use in their "air" meetings.

Radio.—Thirteen radio talks have been provided, two as direct broadcasts, eleven as tape-recordings which have been borrowed many times for country stations' farm radio sessions.

Home-makers Schools.—This year the Senior Extension Officer (Women's Service) has not conducted a rural home-makers' school but was able to assist by advisory correspondence and notes a school of that sort promoted in South Australia by the Country Women's Association. The assistance included advice on overall programming, sources of speakers and demonstrators, discussion topics, and supply of copies of programmes of homemaker schools conducted by the N.S.W. Department of Agriculture in recent years.

16 mm. Cine Films.—Seven cine films of women's interest have been assessed for inclusion in programmes collated by the Division.

Miscellaneous Inquiries.—Numerous inquiries, at the rate of a few per week but not totalled, have been received from farm homes and have been answered direct by letters or referred to more appropriate sources of the information.

Liaison with Other Organisations.—The Senior Extension Officer has fostered and received enthusiastic co-operation from many individuals and other organisations, including other government departments, and retail and wholesale houses, in providing sessions for women at rural gatherings. Similarly she has maintained effective liaison with the Country Women's Association, the Associated Country Women of the World, the Bush Nursing Association, the Good Neighbour Council, and the Junior Farmer Clubs.

Canadian Women's Tour.—A four-days tour of parts of N.S.W. has been planned for a group of Canadian women travelling home to Canada via N.S.W. from the Associated Countrywomen of the World Conference in Ceylon.

Short-Term Schools

The Division of Information and Extension Services organised, and provided tutorial staff for five short-term schools in 1956-57.

Extension Service Methods Schools.—One in-service school was conducted for departmental officers, at Newport in March, 1957. Thirty-five officers, plus the tutorial staff from this Division, were in residence for ten days.

An introductory course in extension service methods was conducted for University of Sydney 2nd-Year Agriculture students, at Newport in June, 1957. Forty-five students were in residence for five days. A similar course was conducted for five days at Wagga Agricultural College for thirty-three 1st-Year students, in September, 1956.

Rural Leadership Schools.—The two Leadership Schools promoted for the Agricultural Bureau were organised and staffed by this Division. The school at Hawkesbury College in July, 1956 was attended by twenty-two men, for five days, and the school at Newport in January, 1957 was attended by twenty-four women, for eight days.

Extension Service Methods Examinations

The Divisional Chief sets the Extension Service Methods paper required under Public Service Board Regulation 124, examining field officer candidates for promotion to higher salaries (Grade III). Fifteen candidates were examined in March, 1957. In addition, some fifty essays by field officers on lower salaries, candidates for promotion (within or from Grade I), have been examined for quality and clarity of expression as affecting extension service.

An examination in "public relations and leadership" was set and marked for thirty-three Wagga Agricultural College 1st-Year students.

Miscellaneous Representation

The Divisional Chief represented agricultural interests as a member of two Government agencies, the N.S.W. Film Council and the N.S.W. Advisory Board of Adult Education.

The Agricultural Bureau Organiser represented the Bureau in the State Council of Junior Farmer Clubs, the Rural Education Committee of the N.S.W. Primary Producers Union, and the Milk Zone Dairy Farm Advisory Committee.

The Senior Extension Officer (Women's Service) represented the Agricultural Bureau in the N.S.W. Bush Nursing Association, the Good Neighbour Council, and in certain Country Women's Association discussions affecting the Bureau.

The Editor of Publications continued the Australian Broadcasting Commission's fortnightly "Roadside Mail Box", broadcast on alternate Sunday mornings.

DIVISION OF REGIONAL EXTENSION SERVICES

A communication from the Public Service Board, 23rd April, 1957, has advised the Department of decisions pending, including the establishment of a Division of Regional Extension Services with Mr. J. L. Green as Acting Chief on probation for twelve months.

Seven Agricultural Regions

The policy of decentralised administration of services has developed considerably. At 30th June, 1956, there were four Regional headquarters, Wagga, Lismore, Orange and Goulburn, and in the past year three more, Leeton, Tamworth, and Maitland, were established.

Extent of Regions.—The Regions are based on shire boundaries and contain 110 of the 133 shires in the Eastern and Central Divisions of the State. There are 55,000 farms (78 per cent.) in the Regions.

Personnel in Regions.—There are 283 officers stationed in country districts for advisory and closely allied services. This does not include veterinary, agricultural college, research institute, experiment station, and office assistance personnel. Two hundred and fifty-four (89 per cent.) are within the seven Regions.

Decentralisation within Regions.—Locations of officers in each of the Regions created during the year are as follow:—

South Western Region, Leeton: Leeton, Griffith, Narrandera, Berrigan, Deniliquin and Barham.

Northern Region, Tamworth: Tamworth, Inverell, Wallan-garra, Glen Innes, Guyra and Armidale.

Mid Coast and Hunter Region, Maitland: Maitland, Kempsey, Taree, and Singleton.

Induction Period.—Field officers new to a Region are now given a period at Regional headquarters with the Supervisor and experienced officers before taking up duty in the district of appointment.

Regional Advisory Committees.—An Advisory Committee is operating in each Region. Each Committee consists of the Regional Supervisor, as chairman, six primary producers representing different industries and parts of the Region, and a citizen from the Regional headquarters city.

Regional Publicity.—Employment of a Publicity Officer, under the Agricultural Extension Grant, in each Region has continued the remarkable increase in decentralised Press and radio use of agricultural information.

In respect of radio in extension service, an example is drawn from the Western Region. Five years ago there was no sponsored broadcasts and generally only intermittent broadcasting by officers. Last year there were fourteen sponsored and/or regular sessions, with many other casual periods for special announcements. A total of 623 broadcasts of material supplied by officers of the Region was made over the six radio stations in the Region, and 237 were original recordings.

Approximately 600 individual Press statements were issued in each Region. The amount published varied between 60 per cent. and 90 per cent. in the different Regions.

Schools for Farmers.—North Coast Region held some "Retresher Courses for Farmers". South Coast and Tablelands Regions conducted "Schools for Farmers" in conjunction with farmers' organisations and dairy co-operatives. Western Region in close co-operation with branches of the Agricultural Bureau held an "Animal Husbandry and Agriculture School".

Field Days and Show Exhibits.—Field days were held as a normal extension medium in all Regions. Some of the attendances extended into hundreds. The nature of other days called for attendance only of a few. In this category were sheep industry field days at which a farmer and perhaps six or eight of his neighbours would collectively class the farmer's flock, under the direction of the Sheep and Wool Officers.

Department of Agriculture exhibits and associated information centres manned by field officers, at the major country shows, helped to widen the range of personal contacts made by field officers and to increase farmers' contact with the Department's advisory services.

Southern Region

Southern is the oldest Region, having been inaugurated at Wagga on 3rd February, 1953.

Regional Advisory Committee.—The Southern Regional Advisory Committee has been active. As recorded in the previous year's report the Committee sponsored an agricultural survey in the eastern section of the Region. This provided interesting and useful information to extension officers and others.

Pasture and Animal Husbandry Schools conducted at Wagga Agricultural College were sponsored and assisted by the Committee.

Fodder conservation has been the theme of many of the discussions at Committee meetings. A publicity campaign has been planned, to exploit field days, meetings, Press and radio, to the full.

Pasture Seed Certification.—Production of subterranean clover seed is a major industry in Southern Region, and last season a record of 1,780 tons of certified seed was produced by 294 growers. Inspection in the field, bag sealing at harvest, and the following of the various lots of seed through to the final sealed bag of certified seed, comprised a major undertaking which was successfully carried out by the field staff.

Agricultural Students.—Southern Regional and Wagga Agricultural College staff took active organising parts in a contest sponsored by the *Wagga Daily Advertiser* newspaper to encourage students from Wagga and district to take up agriculture as a profession. Prize money totalling £100 was donated by the Rural Bank and local industry. The contest consisted of questions and written replies on agriculture.

North Coast Region

Established on 20th May, 1953, and originally known as "Far North Coast Region", the name was changed early in 1957 to "North Coast Region".

Regional Advisory Committee.—This particularly active Advisory Committee has met at Lismore and Grafton. Since inception, one of the foremost objectives has been an artificial breeding station in the Lismore district. An artificial breeding sub-station will be opened at Wollongbar Experiment Farm early in September, 1957. Semen will be obtained from breeding stations at Berry and Muswellbrook.

Pasture and Herd Improvement Competition.—The *Northern Star* newspaper at Lismore provided prize money amounting to £100 for a Pasture and Herd Improvement Competition under the sponsorship of the North Coast National Agricultural Society. Forty-seven farms were entered for it. Regional staff, assisted to draw up the conditions, prepared the score points system, and did the judging.

Agricultural Bureau.—Formation of new branches of the Agricultural Bureau has been a prominent activity in the North Coast Region. New branches formed in 1956 were followed by a further five new branches in 1957. In consequence the numerous branches have formed a new Agricultural Bureau Divisional Council. This promoted a very successful first Annual Convention for Tweed-Richmond Division of the Agricultural Bureau, held at Kyogle.

Dairy Industry Extension Grant Demonstrations.—Eighty-five pasture demonstrations under the Dairy Industry Extension Grant are located in North Coast Region. Maintenance of legume growth in pastures, particularly in paspalum pastures, has been a problem for many years. Eighteen demonstrations have been established to show the advantages of sod-seeding vetches into pastures to provide winter and spring feed. Success of these demonstrations is indicated by the fact that approximately 3,000 acres in the northern portion of the North Coast Region have been sown to vetches this season.

Western Region

Western Region was established on 10th December, 1953.

Additional Field Officers.—The first officer appointed to a district specifically to advise on beef cattle husbandry has been located at the Western regional headquarters in Orange. His designation is "Livestock Officer (Beef Cattle)".

A District Agronomist has been appointed to Bathurst, the first time this position has been filled for several years. At present he is largely concerned in serrated tussock control.

Show Exhibits.—Exhibits, in collaboration with Bathurst Experiment Farm, staged at the Bathurst and Orange Shows, were outstanding. At Bathurst Show the frontage of the Department's exhibit was 50 feet in length, and much more than any other exhibit.

Serrated Tussock.—Thirty-five control demonstrations under the Commonwealth Agricultural Extension Grant have been established in the Bathurst district. These are having a marked influence on the attitude of farmers to the control of this weed, and many farmers are taking action. Also an area of fifty acres of pasture land badly infested has been leased from a farmer and used, in co-operation with Bathurst Experiment Farm, as a research centre for serrated tussock control and eradication.

Office Accommodation—Orange.—Office accommodation at Orange Regional headquarters, is unsatisfactory. Prior to establishment of the Western Region, eleven officers occupied four rooms. There are now twenty officers therein, and two additional appointments about to be made.

South Coast and Tablelands Region

This Region was established on 14th April, 1955.

Regional Research and Extension Study.—A committee has been set up comprised of two members of the C.S.I.R.O., and three officers of the Department, with the Regional Supervisor

as chairman, to plan and control a survey in the southern tablelands. The aim is to determine the current position and what factors stand in the way of achieving the area's agricultural potential.

The survey has aroused considerable interest amongst landholders in the Yass River Valley area where it is in operation at present.

Damage Assessments for the State Electricity Commission.—Construction of a main power line by the State Electricity Commission between Dapto and Yass resulted in damage to farming properties on the route. Regional officers assisted the Commission in assessing twenty-one separate claims ranging from destruction of trees, fences, gates, roads and pastures to loss of production due to disturbance of stock.

Drought.—The greater part of the Region was declared a "drought area" during May and June, 1957. Many graziers had good quantities of stored fodder, but others had failed to make provision for a dry spell. During April, May and June, large tonnages of fodder were brought into the Region. It has been estimated that 25,000 tons of feed of various kinds were delivered by rail and 10,000 tons by road.

South Western Region

South Western with headquarters at Leeton, was inaugurated on 1st November, 1957.

Extent of Region.—South Western Region includes the Murrumbidgee Irrigation Areas and irrigation areas and districts on the northern side of the Murray River such as Wakool, Deniboota and Berrinquin. The Region includes 5,281 agricultural holdings. It is bounded on the south by the Victorian border, on the west by the Western Division of N.S.W., on the north by Bland Shire, and on the east by Southern Agricultural Region. The following shires constitute the Region: Berrigan, Carrathool, Conargo, Corowa, Jerilderie, Leeton, Murray, Murrumbidgee, Urana, Wade, Wakool, Waradgery, Windourin and Yanco.

Regional Personnel.—Mr. G. A. Crawford, who was Agricultural Organiser, Murrumbidgee Irrigation Area Agricultural Service, was appointed Regional Supervisor. The M.I.A. Agricultural Service ceased to function, as such, as from 31st October, 1956.

Personnel in this Region are the Regional Supervisor, five District Agronomists, two Livestock Officers (Sheep and Wool), four Fruit Officers, two Dairy Officers, one Entomologist, one Biologist, one Publicity Officer, one Italian Liaison Officer, six Fruit Inspectors, six Field Assistants, and three Herd Recorders. The Entomologist and Biologist positions are vacant at present.

Advisory Committee.—A Regional Advisory Committee similar to those operating in other Regions was inaugurated at Leeton on 7th February, 1957.

Expansion of the Murrumbidgee Irrigation Areas.—Departmental officers at Leeton and Griffith have taken an active part in preliminary discussions for the planned increase of irrigation areas in the south-west.

Horticultural Losses.—As a result of the abnormally wet winter of 1956, some 330,000 fruit trees were lost. In many cases entire orchards were lost. Rehabilitation of orchardists is being undertaken, and officers of the Region are actively associated with the planning.

Italian Liaison Officer.—Approximately 50 per cent. of irrigation land in the Griffith district is owned or farmed by Italians. Many do not speak English. Many have had only limited experience in irrigation practices.

The Italian Liaison Officer has encouraged Italian farmers to join their district agricultural extension group. Whereas previously only two or three persons of this nationality would attend the meetings, it is now not unusual to find twenty to thirty present.

Northern Region

Northern Region, with headquarters office in the Land Board building at Tamworth, was established on 14th February, 1957.

Extent of Region.—Northern Region is bounded on the east by the coastal Region, on the north by the Queensland border, on the south by the Hunter Valley and in the west by the shires of Liverpool Plains, Namoi and Bulooroo. It includes 6,644 agricultural holdings. It is comprised of the following fifteen shires: Ashford, Barraba, Bingara, Cockburn, Dumaresq, Guyra, Macintyre, Mandowla, Nundle, Peel, Severn, Tenterfield, Uralla, Walcha, and Yallaroi.

Regional Personnel.—Mr. R. D. Eastoe, an officer of the Division of Animal Industry who was Livestock Officer (Sheep and Wool) at Wagga, was appointed Regional Supervisor.

Personnel in this Region are the Regional Supervisor, four District Agronomists, five Livestock Officers, one Fruit Officer, two Dairy Officers, one Publicity Officer, three Fruit Inspectors, four Field Assistants, and one Herd Recorder.

Advisory Committee.—An Advisory Committee has been formed. The inaugural meeting will be held on 18th July, 1957.

Regional Publicity.—Appointment of a Publicity Officer has resulted in a marked increase in Press and radio publicity. Regular radio sessions have been established or are near to establishment on all radio stations in the Region. Press releases are now regular, and are popular with the Press. At Tamworth Agricultural Show the Department established an inquiry office and also screened agricultural films.

Mid-Coast and Hunter Region

Mid-Coast and Hunter Region, with headquarters office in the Lands Department building at East Maitland, was inaugurated on 12th June, 1957.

Extent of Region.—This Region comprises the coastal strip from Kempsey to Morisset and includes the Hunter Valley. It contains 8,102 agricultural holdings, and the following thirteen shires: Gloucester, Hastings, Greater Cessnock, Lake Macquarie, Lower Hunter, Macleay, Manning, Muswellbrook, Patrick Plains, Port Stephens, Stroud, Upper Hunter, Wallarobba.

Regional Personnel.—Mr. D. W. Crowfoot, previously District Dairy Officer, Taree, was appointed Regional Supervisor.

Personnel in this Region are the Regional Supervisor, two District Agronomists, seven Dairy Officers, one Publicity Officer, one Fruit Inspector, three Field Assistants, and nineteen Herd Organisers and Recorders.

Publicity Officer.—The Publicity Officer for Western Region has been transferred to Mid-Coast and Hunter Region.

Agricultural Extension Grant

In 1952 the Commonwealth Agricultural Extension Grant to assist the States to develop and extend their agricultural advisory service was instituted. The initial grant was £200,000 per annum, of which New South Wales was allocated £50,000. The grant was increased in 1955 to £300,000, and New South Wales was allocated £75,000. Recently the Commonwealth Government decided to continue the grant until 30th June, 1960, at a rate of £250,000 per annum, of which New South Wales will receive £62,500. The position will be reviewed before 1960, to decide as to whether the grant will continue beyond that year.

Projects.—Seventy-six individual projects with the aid of the Agricultural Extension Grant are being conducted by the New South Wales Department of Agriculture and many of the projects are multiple. For example, in the pasture projects there are more than a thousand pasture demonstrations. Almost all are on the properties of farmers. The projects are concerned with pastures, crops, livestock, extension aids including staff, equipment and publications, and a system of trainees and cadets at agricultural colleges and the universities.

HAWKESBURY AGRICULTURAL COLLEGE

Student Enrolment.—The enrolment was one less than the record enrolment of 1956. Admissions to Agriculture were nine less than the 1955 record, but this was due to increased enrolments in the first years of the Dairy Technology and Food Technology Diploma Courses. In both these cases the enrolments constituted records. Enrolment comparisons at the commencement of the first session were as follows:—

Course	1955	1956	1957
Agriculture—Third Year	55	63	61
Agriculture—Second Year	72	69	57
Agriculture—First Year	73	66	64
Dairy Technology—Second Year	6	8	15
Dairy Technology—First Year	9	16	19
Food Technology—Second Year	5	4	7
Food Technology—First Year	4	8	10
Totals	224	234	233



Plant Nutritional Experiments

In glasshouses at Hawkesbury Agricultural College intensive research into plant nutritional requirements is in progress, including studies of response of plants to trace elements. One trial tested varying rates of lime for effect on legume nodulation and availability of sulphur, phosphorus and molybdenum.

(Photo. from Hawkesbury College.)



Theory plus Practice

Practical instruction to Hawkesbury Agricultural College students is not restricted to activities within the college grounds. Here a lecturer explains the significance of observations made during a tour of northern districts. Several instructional tours are conducted each year.

(Photo. from Far North Coast Region.)

Fourteen of the students are from other States or overseas, whilst 53 per cent. are from New South Wales country districts. The admission from Agricultural High Schools in 1957 was fourteen.

Of the 100 students admitted in 1957, forty had gained the Leaving Certificate, thirteen had completed the fifth year but failed in the Leaving Certificate examination, and sixteen had completed fourth year at high school.

It was possible this year to admit to the Agriculture Diploma course all eligible applicants who had applied approximately two years ahead. Applications for admission to the Diploma courses in Dairy Technology and Food Technology again showed notable increases.

Diploma Examinations.—Seventy-five students were successful in the 1956 final examinations. Sixty-three of these students obtained Diplomas in Agriculture, including four at Honours standard. Eight students completed the Dairy Technology Diploma course, three at Honours standard, including one First Class Honours, whilst four completed the Food Technology course. No Honours were awarded in Food Technology.

Ex-students.—The total number of students since the inception of the College, including those in residence, is 5,340. The proportion following vocations appropriate to their agricultural training is estimated at 78 per cent.

Extra-curricula.—The Student Representative Council, The Sports Club, The Debating Society, The Dramatic Club, The Camera Club, The Student Christian Movement and the College Branch of the Agricultural Bureau helped to promote the social life and welfare of the College.

Twenty-one students were enrolled in a Life Saving Class and were examined by the Australian Life Saving Society. Thirty awards were obtained.

Rifle shooting and tennis teams took part in the Inter-collegiate contests held at Dookie Agricultural College, Victoria. The College rifle range, extensively damaged by flood rains in 1956, was reconstructed.

Considerable activity has taken place over recent months in raising funds for the purpose of building an Olympic Swimming Pool, in the College grounds. Student committees were set up to handle the various aspects of this venture.

College Library.—The College Library has continued to expand steadily, 1,946 new books being added to the stock, making a total of 2,514 books, exclusive of periodicals and pamphlets.

The fee of ten shillings per student per session came into operation at the beginning of the year. This allowed the purchase of both technical books and general reading material, resulting in a higher proportion of purchases to donations than previously and is broadening the scope of material available.

Bulk loans from the Circulation Department of the Public Library were continued. This has been a most useful supplement to the collection and has been widely used by both staff and students.

A check on library usage showed an increase over last year of approximately 6 per cent.

Student Tours, Visits.—Senior students in Agriculture visited the M.I.A. for instruction in irrigation techniques. They also visited northern agricultural districts, a number of properties in the County of Cumberland and wool stores in Sydney. Senior Dairy Technology students made the annual tour of Hunter Valley dairy factories and of major dairy product and cold store establishments in the metropolitan area. The first year Dairy Technology students attended a Dairy Science School at Grafton. All Food Technology students were conducted on inspections of commercial canneries. The second year class visited the M.I.A. during fruit harvesting and processing, and spent several days at Gordon Edgell and Sons Limited, Bathurst, to gain commercial experience of vegetable processing.

Students visited the Sydney Royal and the Sheep Show for education purposes, including experience as Stock Attendants and/or competitors in stock judging.

University Undergraduate Courses.—Practical demonstrations in Farm Management and Machinery were provided for students in the second year of Sydney University Agricultural Science Course.

Farmers' Schools, Conferences, Field Days, etc.—Winter Schools for farmers were conducted in dairy farming, poultry farming, pig raising and tractor maintenance. Schools in

dairy farming and pig raising were provided for Junior Farmers. The summer school in Apiculture was also conducted. The annual Poultry Field Day was held.

The 32nd Annual State Congress of the Agricultural Bureau of New South Wales and a Leadership School for members of the Agricultural Bureau, the Country Women's Association and other rural organisations, were held at the College in the winter vacation.

The facilities of the College were made available for the holding of residential conferences of District Agronomists and Junior Dairy Officers.

A School for Dairy Factory Apprentices was held as required under the Dairy Factory Apprenticeship Scheme.

Buildings, etc.—Suitable accommodation for bulls at the College was provided by the erection of five double bull sheds and fences to subdivide the area into ten paddocks. A building programme for the Poultry Section with funds provided from the Agricultural Extension Grant was completed. Improvements in the Pig Section included the erection of a deep litter shed, renovation of the farrowing pens and provision of creep feed facilities, renovation of the boar pens and installation of individual metal feeding stalls for brood sows. An automatic watering system was installed in all pens, and modern self-feeders in the deep litter pens.

Considerable improvements were carried out in the Sheep Section by provision of an extensive drainage system, concreting of counting-out pens, forcing yards, races, and the floors of the engine room and the skin drying shed. A water supply was laid on to the section and repairs and renovations to the woolclassing room and old shearing shed carried out.

A potting shed, for use with the plant nutrition glasshouses, was erected, necessary funds being provided from the Estate of the late Emanuel Haropoulous.

Extensive repairs and renovations for stable square, feed shed and saddlers' shop were completed.

Other work completed included extensive repairs to one of the cottages, construction of ash and fuel bins at the kitchen, renovation of the kitchen compressor room, extensive repairs to the grandstand, fly-proofing of the dining hall and kitchen, renovation of the College tuck shop and gravelling and resealing of a number of roads.

Installation of the P.A.B.X. telephone system was not completed, but a temporary manual switchboard with additional extensions was installed.

Major items of equipment received included irrigation equipment for the farm and agronomy sections. A new kitchen boiler was installed.

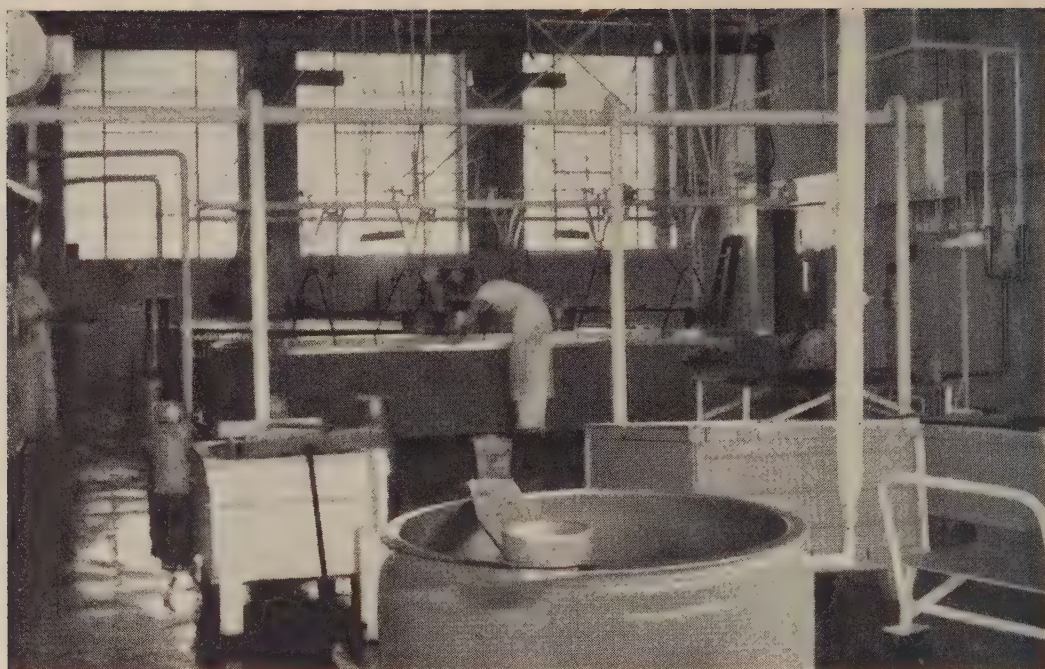
Changes in Curriculum.—Commencing in the first session of 1957, some instruction in woolclassing is being given to Agriculture I students to provide a better balanced course in this subject and to promote more interest in the initial diploma training period.

Agricultural Engineering was included as a final year subject in 1956. This has resulted in a more logical re-grouping of subject matter, at the same time rightly emphasising the importance of Agricultural Engineering by giving it the status of a separate full subject.

Forestry and timber work is now receiving attention. Replacement of the pine forest and planting of considerable areas each year with narrow leaf ironbark is being undertaken as a student project.

Sectional Operations at Hawkesbury

College Farm.—Four hundred acres were sown to cereals for hay, grain and silage in 1956. The early sown crops grew and yielded very well, but those sown later were very poor. Two hundred tons of oats and wheaten hay and 63 tons of red clover and pasture hay, all of excellent quality, were harvested. Ninety tons of oats silage were conserved and 450 bushels of oats and barley were harvested. Hay reserves at 30th June, 1957, totalled 150 tons (all cereal hay); 440 tons of maize and saccharine silage were conserved in the tub silos; and 33 tons of pea vine and pasture silage were made in a pit. Thus a total of 573 tons of silage was produced, compared with none the previous year when floods destroyed the crops. One hundred acres of oats were sown in March, 1957, and 250 acres of wheat and oats for hay and grain were sown in April. A good germination was obtained, but prolonged dry conditions retarded growth. A further 145 acres of cereals were sown in late June, bringing the total area sown to 495 acres. Sixteen acres of lucerne were sown in the



Only the Best . . .

The Dairy Technology School and factory at Hawkesbury Agricultural College have been described as the best of their kind in the world. The factory is equipped with the most up-to-date plant and facilities. This is the cheese section.

(Photo. from Hawkesbury Agricultural College.)

Richmond and Glebe paddocks. Fifty acres were sown to Japanese millet in the spring of 1956, but germination was poor and the crop was grazed by sheep.

Rainfall during the year was insufficient for good pasture production. A satisfactory setting of seed occurred in the spring, but the opportunity was taken to harvest several hundred pounds of white clover seed. The area sown to pastures in the autumn of 1957 totalled 235 acres. Owing to the dry autumn and early winter, top-dressing of pastures was delayed.

Approximately 20 tons of potatoes were harvested from an area of five acres. Another crop has not yet been harvested. A good crop of pumpkins was grown, the yield being 10 tons from an area half an acre.

Satisfactory progress was made in the fencing programme during the year. A lease for splitting fence posts in the Grose Wold area was obtained from the Forestry Commission so that several hundred ironbark posts were obtained at low cost.

The storage dam project progressed satisfactorily and is nearing completion. This project involved the moving of 25,000 cubic yards of soil which was done with one small bulldozer.

Bush fires during the summer months destroyed fencing in several of the Yarramundi paddocks as well as a considerable area of pasture reserved for summer grazing.

Four new tractors were received on loan from machinery firms to replace earlier models. In all, twenty-two items of machinery, apart from tractors, were acquired, either on loan from firms or by purchase. Tractor firms again helped to make a success of the winter school on tractor maintenance.

Orchard Section.—The worst weather conditions since 1946 brought about heavy losses in some crops, particularly of pears and grapes, this crop being destroyed by birds and hail. The navel orange crop matured earlier than on any previous occasion and was harvested before the end of July. Grapefruit yielded well and over 2 tons of fruit were supplied to the Cannery. Stone fruits, particularly peaches, gave reasonably good yields.

Plantings of apricots, peaches and plums made good growth, but required frequent watering.

There was a patchy red scale infestation on the citrus trees. Pome trees were maintained free of pests and diseases. No fruit fly was seen until the end of February, but the later clingstone peaches were heavily infested. A heavy infection of brown rot was also apparent on these.

Replanting of the pine forest, destroyed in the 1956 hurricane, was carried out, but dry weather and strong winds caused heavy mortality in the young trees.

Cannery and Food Technology.—Increased interest in the Food Technology course resulted in a record enrolment of ten students in the first year of the course.

A commercial rotary dicer and slicer unit was obtained; this will greatly facilitate the processing of increased quantities of root vegetables. Extensive alterations and modifications were carried out in the cold storage room and "Flash" freeze unit. The increased plate area in the cold storage room will provide improved storage conditions for quick-frozen products.

Vegetables processed included 17,000 lb. canned and more than 4,000 lb. quick frozen as well as 260 lb. of dyhydrated packs. The vegetables included asparagus, beans, carrots, cauliflower, beetroot, peas, tomatoes, sweet corn and mushrooms. Other vegetable products included 948 pints of tomato soup and over 400 cans (16 oz.) of other soups. Fruit processed consisted of 13,000 lb. of canned packs, apricots, apples, grapefruit, grapes, peaches, pears, pineapples, plums and prunes being the fruits treated; 335 fowls were quick frozen.

School of Dairy Technology.—The School is now in full operation and arrangements have been made to ensure sufficient and regular supplies of milk for practical training.

Nineteen students entered the first year of the course in 1957, this being the largest number of students ever to commence in any year of the course. Eight students, including the first two under the Dairy Apprenticeship Scholarship Scheme, completed the course at the end of 1956.

Further installation work was carried out and all items of plant were brought into operation. Some outstanding building work has not yet been completed.

Second year students competed with considerable success in the annual grading competition conducted by the Dairy Factory Managers and Secretaries. First-year students attended a Dairy Science School at Grafton and all obtained the certificates required by the Dairy Industry Act.

Dairy Research Section.—A survey of milking machine efficiency covering eleven dairying districts throughout the State was completed. Further research will be planned on results obtained from this survey. A special school of instruction in milking machine testing was held. An inspection report form was drawn up and issued to field officers for use in recording the results obtained when testing milking machines.

Equipment for an Air Flow Motor Test Station to serve the Commonwealth was ordered and material was being received.

Poultry Section.—At 30th June, 1957, the stock totalled 1,792 and egg production 26,683 dozen.

A Winter School for poultry farmers was conducted, as well as the Annual Poultry Field Day.

Breeding operations were carried out with White Leghorns, Australorps, turkeys, ducks and geese. Improvement work with White Leghorns and Australorps is being done in conformity with the Poultry Improvement Plan (Eggs) and the College flock is listed under the Accredited Poultry Breeders.

The College has been appointed the Official Testing Station for the Accreditation of Breeders' Flocks under the Poultry Improvement Plan (Eggs). Forty day-old pullets will be submitted from breeders in the coming season to be tested for egg production over a period of 500 days.

To carry out the full plan of breed improvement and accreditation work, additional buildings and equipment including 288 twin bird laying cages in a prefabricated shelter, one battery room, two four-deck battery brooders and four four-deck weaner batteries were obtained from Agricultural Extension Grant Funds. Other equipment acquired consisted of ninety-six California-type laying cages for use in Division 3 of the Egg Laying Competition and fourteen growing cages each 6 feet by 3 feet, each divided into three compartments to demonstrate methods of rearing table poultry. An electric de-beaker was donated to the College.

The 56th Egg Laying Competition commenced on 1st April, 1957. The scope of these competitions was extended to include a division in California-type laying cages. A number of breeders entered teams in all three divisions and the opportunity will be taken to compare the three different systems of housing.

The Fourth Random Sample Test concluded on 31st March, 1957. Results showed considerable improvement over the third test. Future tests will be reduced to 500 days, thus allowing up to eighteen groups to be tested each year.

Sheep and Wool Section.—The stock comprises a Romney Marsh stud (ninety-six head); ration sheep; and a commercial flock (677, including 97 rams). Lambing in the commercial flock was very satisfactory, 104 per cent. of lambs being marked.

The dry conditions experienced made management of the flock easier than was the case the previous year. Some losses of stock occurred due to *Clostridium*-like infection. Routine strategic drenching and tactical drenching, when considered necessary, were carried out. Jetting proved very efficient in controlling fly strike. Work on techniques of application of insecticides for prevention of blow-fly strike was carried out in conjunction with the Entomological Branch.

Third-year Agriculture students undertaking Stage II of the Woolclassing course maintained a high standard. Second-year Agriculture students undertaking Stage I of the course also obtained very satisfactory results.

Apiary Section.—There were thirty-five productive hives and nine nucleus colonies at 30th June, 1957. Adverse seasonal conditions during the major part of the year did not permit any increase in the number of colonies. No honey was produced during the year, although most colonies were able to regain their numerical strength, and secure sufficient honey for their own requirements.

Over eighty queen bees were distributed to beekeepers throughout the State. One package of bees was air freighted to Ceylon.

A summer School in Apiculture was conducted.

Piggery Section.—Breeding stock at 30th June, 1957, comprised seven boars (three each of Berkshires and Large Whites and one Tamworth) and twenty-five sows (twelve Large Whites, nine Berkshires and four Tamworths). During the year the Tamworth herd was reduced so that breeding work could be concentrated on Berkshires and Large Whites. There was heavy demand for stud pigs during the year, sixty-six being sold compared with forty-five the previous year.

A deep litter shed was erected and is working satisfactorily. Repairs were carried out to the boar pens. A tree-planting programme was commenced and irrigated pasture areas have replaced a number of dirt yards.

Litter testing was adopted as a routine practice with all litters, though insufficient data are available to form definite conclusions.

A School for Junior Farmers was conducted in June, 1957.

Cattle Breeding and Management Section.—After transfer of nine cows and fifteen heifers to Wagga Agricultural College the remainder of the Jersey herd was sold by auction at the College on 24th May, 1957. Despite the dry conditions at the time of the sale, the forty-seven head sold realised £1,582. Prior to the sale, eleven bulls and six females were sold to breeders.

The Friesian stud totalled 128, including six bulls on loan to farmers. Demand for bulls weakened considerably during the year.

Production figures for 1956-57 showed a very substantial rise in both milk and butterfat; thirty-three cows averaged 12,343 lb. milk and 425 lb. butterfat. One cow "Hawkesbury Akrinjo's Bonnie", produced 15,697 lb. milk and 567 lb. butterfat in her first lactation period as a mature cow.

The Aberdeen Angus stud was sold at a dispersal sale held at the College on 10th April, 1957. At this sale, thirty-seven lots averaged eighty-nine guineas per lot, the top price being 300 guineas for a cow with calf at foot. The herd sire, Trangie Erison 25th, was not sold but transferred to Grafton Experiment Farm.

The funds obtained from the sale of the Aberdeen Angus stud were used to purchase a bull and sixteen heifers as foundation stock for a Poll Hereford stud. These stock were purchased from Pylara, Dimby Downs and Wootten studs.

A team of Friesian cattle was exhibited at the Royal and Hawkesbury District Shows with considerable success. Of particular interest was the award of the breed championship to the imported bull "Sniders Fond Hope King" at both Shows.

A School for Junior Farmers was conducted in June, 1957.

Horses.—Kirkbride's Choice (imp.), a stallion, and seven mares were added to the Clydesdale stud. Four Arab and four Clydesdale foals were born during the year. The Arab colt "Ganymede" was sold for 250 guineas and a Clydesdale colt for 50 guineas. Four young coach horses were broken in to work during the year and six coach horses and three aged draught horses were transferred to other institutions. No horses were shown at the Royal Show, but a non-competitive team of nine horses was exhibited at Hawkesbury Show.

Research Agronomy.—Extreme dry weather had an adverse effect on all established field trials which could not be irrigated and prevented the sowing of new trials where no irrigation was available.

Vegetable Breeding work was continued with tomatoes, beans, and peas. This breeding programme has now reached the stage where new tomatoes for the fresh fruit market and the canning trade can be recommended. New bean varieties are showing promise in their final test stages while the pea breeding programme is progressing satisfactorily. The testing of numerous introductions of vegetables has been completed and some vegetable fertiliser trials were continued.

Pasture field trials were continued both on farmers' properties and on College land. District species and fertiliser trials have enabled general recommendations to be made re species and fertiliser programmes suitable for this area under irrigated and also natural rainfall conditions. Research is now being directed to specific aspects of species and fertiliser use, such as the role of nitrogenous fertilisers in pasture improvement. Nodulation and establishment problems are also receiving attention.

The weed control research work begun during the year was directed mainly towards pre-emergence weed control in vegetable crops, although some work was done with maize and pasture species. Various chemicals tested show promise of giving effective weed control without crop damage under certain conditions in the following crops:—onions, peas, beans, maize, lucerne, red and white clovers. A survey of weed problems throughout the State, as a basis for future work, was completed.

The field crop research programme was concerned chiefly with sorghum and maize. Variety, spacing and fertiliser trials were completed successfully. Seed increase plots of leaming maize and saccaline sorghum were grown. Some breeding work with sweet sorghum was carried out. The oats uniform-yield nursery was again sown. Fodder and green manure trials with kale, rape and lupins were continued.

Plant nutrition research continued satisfactorily in the two glasshouses. The recent construction of a potting shed will greatly facilitate this work. Routine testing of soils from areas throughout the State showed deficiencies of phosphorus,

sulphur, molybdenum and potassium. In addition, the plant nutrition agronomist undertook pot work on a number of particular problems such as the placement of phosphate fertiliser, lucerne nodulation on Tableland soils, and lime-induced minor element deficiencies.

WAGGA AGRICULTURAL COLLEGE AND EXPERIMENT STATION

Student Enrolment.—Intake is still limited by available accommodation. Demand for enrolment continues firm and at 30th June, 1957, bookings are closed to the end of 1963. A peak figure of eighty students was reached at the commencement of the first session, 1957. Comparisons at mid-year are tabulated:—

	Enrolled Students		
	At 1st July, 1955.	At 1st July, 1956.	At 1st July, 1957.
Third Year	18	21	21
Second Year	22	22	28
First Year	23	30	30
Totals	63	73	79

Diploma Examinations.—All twenty-one students successfully completed the Agriculture course at the 1956 final examinations. The Dux obtained Honours Class I, and three others Honours Class II at graduation.

Ex-student Statistics.—At 30th June, 1957, there were 160 ex-students. 114 of whom had gained diplomas (including sixteen Honours graduates). The remaining forty-six left before the commencement of their third year at the College.

The employment of these 160 ex-students is classified hereunder:—

1. Following agriculture:—	
(a) On farms	93
(b) In Government Departments or Commissions:—	
Agriculture	15
Soil Conservation	4
Australian Broadcasting Commission ..	3
Rural Bank	2
Education	3
(c) In commercial firms	17
(d) Undergoing further training	6
	143
2. Left agriculture	7
3. Occupations unknown	10

The Old Boys' Union is very well supported. Its Sixth Annual Reunion in Wagga in May, 1957, was attended by sixty Old Boys and staff. It has financed College Car Badges and Pennants for re-sale to members and established a fund towards an eventual Old Boys' Union.

Student Tours.—Three regular tours, to the South Coast and Tablelands in October, 1956 (five days); to Batlow in November, 1956 (four days); and to the Murrumbidgee Irrigation Area in March, 1957 (five days)—were undertaken by all Senior students.

Various half- or one-day tours were conducted to prominent local sheep and/or cattle studs, the Soil Conservation Research Station, the Wagga Wagga Municipal Abattoir, stud stock sales and local mills and factories. Students also visited the R.A.S. Show, the M.P. and A.A. Show and the Wagga Ram Show and Sales for educational purposes. Valuable experience was gained as stock attendants and in stock- and produce-judging competitions.

Curriculum Improvement.—Agricultural Engineering was promoted to the status of a Final Year subject and certain practical agriculture examinations were changed or modified to suit changing commercial farming practices.

In 1957, ten students in the Third Year were permitted to exercise a degree of specialisation in Animal Husbandry. This is the beginning of an Animal Husbandry Diploma course.

Extra-Curricular Activities.—Students engaged in regular annual competitive sports—Rugby Union, athletics, swimming, rifle shooting, tennis and basketball. A College hockey team made its debut in 1956 and there are two teams in 1957. A few enthusiasts commenced to lay down a golf course. College rifle and tennis teams participated in the Annual Australian Agricultural Colleges Sports Association's Contests at Dookie. Other inter-Collegiate sport was confined to football and cricket matches with Hawkesbury Agricultural College teams one Rugby Union match with Queensland Agricultural College and an athletics contest with the Wagga Wagga Teachers' College. Two College students represented N.S.W. in an interstate Ruby Union fixture; another won two State Junior Athletic titles.

The third annual First Aid Class and examinations were conducted by members of the Wagga Ambulance Station Staff. All the thirty-six students attending obtained the St. John's Ambulance Certificate. Annual inter-year debating competitions and public speaking contests were held intra-murally.

Official Functions, Schools, Conferences, Field Days, etc.—The number of official and private visitors singly or in small groups from Commonwealth and other State Departments and overseas increased considerably on previous years.

Group visits were made by Junior Farmers (Rand, sixty; Central Coast, forty); Post congress tour (International Grasslands (N.Z.), twenty-five; Conference of Royal Australian Chemical Institute, Cereal Chemistry, forty-five); and four other mixed touring parties.

Organised winter schools in July, 1956, were Junior Farmers (attendance twenty), Turkey School (fifty), University of Sydney Second Year Agriculture students (forty-five); and in June, 1957, Pasture and Animal Husbandry School (forty-five).

Three major Field Days were held during the year, one sponsored by I.C.I.A.N.Z. in October, 1956 (350), one sponsored by the Farmers and Settlers' Association in April, 1957 (150), at which all local Departmental staff co-operated in providing instruction and demonstrations, and one for Beef Cattle in November, 1956 (sixty). Two smaller Field Days, each attended by approximately thirty farmers, were held in November specifically to demonstrate local applications of Keyline farming and forage harvesting equipment respectively.

The College and Institute provided facilities for regular quarterly meetings of the Southern Agricultural Region Advisory Committee.

Various College officers judged or acted as stewards at several country shows and assisted in other ways with extension work. The Farm Supervisor again judged the Northern Section of the State Field Wheat Championships.

Officers of the Division of Information Services, Division of Marketing and Agricultural Economics and Hawkesbury Agricultural College provided tuition in Public Relations, Economics and Saddlery demonstrations respectively. Wagga Wagga Technical College co-operated in supplying tuition in Engineering, Business Principles, Bookkeeping and Woolclassing as in former years.

Diploma Day, 3rd May, 1957, was in many respects the best function of its kind to date, attendance being 450.

The Minister for Agriculture and Minister for Food Production presented the Diplomas, Prizes and Sports Trophies to successful students. The Under Secretary and Director again was a welcome guest.

Works and Improvements (see also *Sectional Operations*).—Work on the Graham Block and the other new buildings, and alterations to existing buildings made good progress. It was possible to occupy the new officers' quarters in February and the Dining Room extension about the same time and also to have occasional use of the new Assembly Hall for functions and examinations. The sewerage treatment works has been completed and all major buildings and most of the cottages connected thereto. Work is proceeding on a sub-contract to connect the remaining cottages. Landscape plans for the College quarters area were drawn up; their full implementation awaits the completion of the building programme.

Levelling of the College oval and two new tennis courts was completed by contract. Farm and student labour added the finishing touches including the laying down of the turf wickets and sowing the oval.

The old Chemistry hut-laboratory was renovated and reorganised to accommodate the needs of Woolclassing instruction following demolition of the barn.

The following buildings and equipment were erected by farm and student labour: one Nissen hut, one machinery shed, one tractor shed, a fire-fighting headquarters and an overhead

fuel tank for power kerosene. Material from the demolition of the old barn is being re-used in the erection of a single-storeyed shed of the same ground dimensions. The exteriors of the three main quarters buildings were painted.

A further 90 acres was cleared for cropping and pasture improvement on the southern side of the main drive near the Coolamon-road.

Sectional Operations at Wagga

College Farm.—The 1956 cereal acreage and production are tabulated.

	Acres Sown	Bushel Grain	Tons
Wheat—Hay	30	...	35
Wheat—Feed Grain	...	3,191	...
Wheat—Seed	179	346	...
Oats—Hay	10	...	10
Oats—Feed Grain	...	2,098	...
Oats—Seed	105	458	...
Oats—Greenfeed	35	...	...
Oats—Silage	10	...	...
Barley—Feed Grain	12	42	...
Barley—Seed	...	101	...
Barley—Greenfeed	6	...	...

Other farm produce harvested was: Pasture hay (40 tons), lucerne hay (120 tons), subterranean clover (500 lb.).

Fallowing reduced the area of sown pasture to 973 acres of which 790 acres was topdressed. A further 167 acres of lucerne was topdressed—all topdressing being at the rate of 1 cwt. superphosphate per acre. A further 70 acres was cleared in the Frog Hollow area.

Fencing was limited by supplies to 1½ miles of subdivision replaced and ½ mile of new subdivision.

Approximately 200 trees were planted on the farm section.

Major plant received included a tipping trailer fire-fighting unit, an air compressor and a motorised lawn mower.

New loan equipment was received from H. V. McKay Massey Harris Pty. Ltd. (one pick-up baler, one mower, one side delivery rake) and from International Harvesting Company (one mouldboard plough).

Dairy Section.—The herd numbers 106, comprised of 43 cows, three bulls and 60 young stock. Of these, nine cows and 14 heifers were received from the Hawkesbury College herd in February. To accommodate the Hawkesbury stock a reducing sale was held in May, at which 29 females and one bull averaged 47 guineas per head.

The imported bull (The Mount's Orange Boy) has sired 11 good type calves (10 bulls and one heifer).

A further rise in production (275 lb. in 1954-55, 340 lb. in 1955-56 to 420 lb. in 1956-57) was recorded from the 41 cows which completed lactation periods of six months or more, the average milk production being 800 gallons per cow.

During the year, 20 stud bulls and six females were sold for dairy purposes at an average of 40 guineas per head.

A strong team was exhibited at the M.P.A.A. Show in October. The Mount's Orange Boy (imp.) was exhibited at the R.A.S. Show in April, gaining third prize.

Four bull yards and two sheds were erected to provide adequate holding facilities.

Milk fever is still a problem, but vigilance and treatment are uniformly successful in keeping it within bounds.

Piggery Section.—The average (mean of monthly totals) number of pigs kept was reduced by approximately 20 to 135, monthly totals varying from 86 to 161.

The three pure breeds maintained—Berkshires, Tamworth and Large Whites—are now of a high standard. A Berkshire boar was received from Grafton Experiment Farm. Stock were not exhibited at the 1957 Royal Show, but good results were achieved again at the M.P. & A.A. Show in October, 1956.

In addition to supplying the College kitchen, the section sold 65 stud pigs and the demand from farmers continued to exceed supply.

Unusual weather contributed to a slight increase in losses from pneumonia, but overall losses from disease have been normal, considering the adverse housing conditions.

The College slaughter house was repaired and will continue to be used for pig and sheep slaughter until a new one can be erected. Beef cattle slaughter has been discontinued.

Horse Section.—The largest number of mares (85) ever accepted since the commencement of the College Stud were sent for service to the two stallions, Razaz (imp.) and Prometheus.

At the Royal Show, among other awards, the College exhibited the Champion Arab Stallion and Reserve Champion Arab Mare.

Only two fillies were available for sale during the year; more colts should be sold shortly. Total horse numbers have been kept at 70 head or less. A number of hacks have been broken-in for transfer to other Departmental Institutions and sufficient young stock is on hand to overtake some leeway.

As a routine measure, all horses have been vaccinated against strangles.

Beef Cattle Section.—The Poll Shorthorn stud is still in its formative stages, with numbers increasing gradually (53 as against 41 last June).

The standard of calves sired by the two imported bulls is well above average. Some breeding difficulties, thought to be due to subterranean clover dominance in an exceptionally wet winter and spring, have disappeared.

A small commercial herd (16 head) for domestic beef production was commenced. Among these were some reactors to the agglutination test for Leptospirosis, and checking to discover whether they are infective is in progress.

Sheep Section.—In the wet half of the year, footrot and body lice were problems. The latter were quickly controlled following shearing, but it was not until autumn that complete success was achieved with an intensive campaign of treatment for footrot. Vigilance has been thorough ever since.

The dry autumn and early winter necessitated hand feeding of lambing ewes.

The percentage of lamb deaths and dystocias (50 per cent.) has been very high with the Dorset Horn stud, but not abnormal in the commercial (Corriedale) flock.

Thirty stud Dorset Horn ewes were transferred to Temora Experiment Farm for use in the Polled Dorset flock. Two hundred crossbred weaners were purchased for breeding purposes.

Five awards were secured from eight entries at the M.P. and A.A. Show.

Students shearing practice was spread more than in former years, the 19 bale wool clip realising an average price of 61d. per lb.

All stud Dorset requirements of other farms for breeding experiments were met and there was a further unsatisfied demand for c.f.s. ewes and flock rams from the College stud.

Poultry Section.—Flock numbers were permitted to rise to maximum stocking to meet the internal demand for poultry products, comparative figures being:—

	Fowls	Turkeys
30th June, 1956	685	261
30th June, 1957	740	293

The College flocks were re-admitted to the Pullorum-free scheme in January, 1957, old reactors still showing up, but with complete eradication in sight.

Hatchability and fertility experiments are being continued with turkeys.

The major improvement to the section was the installation of a laying shed and cages and a weaning battery.

Apiary Section.—Conditions throughout the year were spasmodic for beekeeping and honey production. However, there was a substantial increase in the quantity and quality of the yield at the commencement of the season.

All hives were maintained in good condition until early winter when the dry spell seriously affected plants which were being relied on to keep hives in maintenance condition. However, stocks of low grade honey are on hand should it be necessary to feed. Swarming has been evident during the spring and well into summer, but it did not present any problem. Restocking is still considered to be a matter of some urgency, although most of the hives were re-queened at the commencement of the season.

Plans were prepared for the erection of a more suitable honey house and a site alongside the sports oval selected as the location of the apiary section.

Orchard Section.—Five months too wet followed by seven months too dry resulted in some tree mortality and some heavy shedding of fruit.

Of the main fruits, apricots and peaches cropped quite well; plums shed heavily; prunes cropped lightly but were of good quality; almonds were nearly equal to the previous good season with plumper nuts; olives were patchy, light yielding and small; pears were light cropping but good quality; apples were variable but produced an average crop of excellent quality overall.

All major diseases and pests were well controlled. A new power spray plant was received during the year.

The following trials were continued: Apple stock trial; Pear pruning trial; Almond seedling trial; Olive stock and variety trial; Prune stock trial.

A pruning demonstration block was planted out and a new nursery site established.

All fruit in excess of local requirements was disposed of by sale, or by transfer to Hawkesbury Agricultural College.

AGRICULTURAL RESEARCH INSTITUTE, WAGGA WAGGA

Wheat Improvement

Field Testing.—Wet conditions prevented trials at Wallendbeen and Quandialla, and those at Wagga and Temora were of little value.

Trials at Condobolin yielded 24 bus. per acre. Stem rust developed late and attacked Gabo, Javelin 48, Celebration and Festival varieties.

Superior Crossbreds.—At Moombooldool crossbreds yielded 40 bus. per acre. Four crossbreds—R.D.R. x 4 Ridley 48, R.D.R. x 4 Insignia 49, Orfed x 4 Dirk 48 and Carlisle x Pusa 4 x Baringa are noteworthy for consistent yields. All four yielded well in trials at Trangie, Leeton and Yanco Experiment Stations.

Breeding for Quality.—Backcrossing for quality was continued, but the unfavourable season made it difficult to assess quality, in many cases.

The findings of the Cereal Chemistry section, set out below, are significant. The validity of the Pelshenke selection test has been questioned and there is a need for supplementary tests.

Breeding for Disease Resistance.—Increasing of disease resistance in standard varieties and promising crossbreds has progressed. A birdproof enclosure at Wagga and irrigation facilities at Temora have permitted the growing of summer generations when severe stem rust epidemics enable effective selection to be made for adult plant resistance to this disease.

New strains of several varieties now possess multiple resistance to both stem and leaf rust.

Wheat Disease Studies

Root-rot Studies.—Investigations into the ability of cereal root-rot fungi to survive in wheat straw incorporated in soils of high and low nitrogen status were continued. Survival of *Ophiobolus graminis* and of *Fusarium culmorum* were promoted under conditions of high soil nitrogen, that of *Helminthosporium sativum* was markedly depressed. Survival of *Curvularia ramosa* was little affected by soil nitrogen status.

Interest now centres on the duration of the survival periods. All fungi except *O. graminis*, which lost viability after twelve months, are still being recovered from the original test straw material.

Studies of the ability of *H. sativum* and *C. ramosa* to carry over in the soil in the free living state, as distinct from survival in crop residues were continued. *H. sativum* was found to have a very limited capacity to survive in spore and mycelial form but *C. ramosa* proved well adapted to a saprophytic existence as a free-living member of the soil microflora for up to fifty-two weeks.

Experiments were begun to determine the capacity of wheat root-rot fungi to saprophytically colonize different types of grass and cereal straw turned into the soil.

Eyespot lodging of wheat (*Cercospora herpetchoides*), hitherto unrecorded in New South Wales, was observed in the Southern Region during 1956-57. The survival and saprophytic colonizing ability of this fungus, and of *Fusarium graminearum*, likewise identified for the first time last season as the cause of a wheat foot-rot condition, will be investigated.

Genetic Studies of Rust Resistance.—This work was continued, especially the study of two unusual types of resistance—originating from *Agropyron elongatum* and a Transvaal wheat variety respectively.

Wheat Quality Investigations

Small Scale Tests.—There is urgent need for reviewing the small scale tests of wheat breeders' material. Supplementary tests, such as flour release by standardised grinding, showed promise.

Microscopic examination by differential straining of starch preparations appears to be the most useful small scale method of detecting and assessing starch damage, but depends, so far, upon the preparation of a normal macro-sample of flour.

Attempts are being made to devise a grinding method which, on small wheat samples, will show varietal differences in the susceptibility to starch fracture comparable with that which occurs during normal milling.

Oat Improvement

Results of the 1956 grazing trials generally agreed with previous results. Varieties such as Yates Algerian and Dale were affected more than others by the wet conditions. Early sown Osage has yielded very well in recent years. However, it is a poor grazing oat with a rather short but plump grain.

Further studies on productivity under grazing conditions have shown that leaf width and tillering capacity are valuable guides to grazing value. Height is not a reliable guide.

Preliminary investigations of grain milling quality indicate that Ukraine and Fulgrain 6 are useful parental varieties, while derivatives of Ballidu and Orient usually possess good grain characteristics. Unfortunately, crosses with the grazing oat Fulghum are usually poor in grain quality.

Pasture Investigations

Subterranean Clover.—Seasonal conditions favoured late maturing strains, so selection of early maturing strains was restricted.

Observations were made on the varietal susceptibility of subterranean clover to leaf scorch (*Kabatiella caulivora*), a disease which was widespread in the Wagga region.

Fertilizer Placement.—An investigation into the effect of fertilizer placement on the establishment of pastures has been commenced.

Weed Investigations

Skeleton Weed Control.—Following the recent investigations on fallow spraying of skeleton weed by the C.S.I.R.O., experiments were initiated to determine the response of wheat crops when sown after fallow spraying under the prevailing conditions at Wagga. Skeleton weed was severely checked by sprays applied at various times prior to sowing, but the anticipated increased soil nitrates were not obtained. This work is being continued.

Soil Fertility Studies

Trials have been continued and extended to include field studies on maintenance and improvement of fertility of the arable soils of the southern wheat-belt. A study is being made of the rate of fertility increase under subterranean clover ley, the management factors affecting this, and the effect of various cropping systems on fertility. Wheat yields and quality are being used as the criteria of fertility. The chemical and physical bases of this fertility are being studied.

Investigations on the effect of clover-grass ley and cropping practices on soil structure have been commenced. Apparatus has been constructed and techniques devised for measurement of the more important physical properties of soils.

Soil Characteristics related to Wheat Quality.—Trials suggest no such simple relationship seems to exist.

Phosphate Solubility and Phosphate Status.—Experiments to determine the level of available soil phosphate and fertilizer requirements of wheat continued, as did work to find a suitable method of predicting fertilizer requirements in the region.

Residual Value of Fertilizer Phosphate.—Experiments are in progress to measure reductions in the availability of phosphate from added fertilizers.

THE COMPOSITION OF THE NITROGEN FRACTION OF THE SOIL

Organic Matter.—In an attempt to characterize the organic nitrogen of soils a start has been made on fractionation studies on several different soils. Use is being made of paper chromatographic techniques and the van Slyke apparatus.

Yours faithfully,

R. J. NOBLE,

Under Secretary and Director.

APPENDIX I

The Accounts of the Department of Agriculture, 1956-57

There was an increase in expenditure from Consolidated Revenue Fund and a reduction in expenditure from General Loan Account during the financial year.

COMPARATIVE STATEMENT OF EXPENDITURE

Account	1955-56		1956-57		Increase or Decrease	
	£	s. d.	£	s. d.	£	s. d.
Consolidated Revenue Fund	3,184,275	18 10	3,380,549	11 4	196,273	12 6
General Loan Account	149,999	0 8	114,962	12 9	35,036	7 11
Totals	3,334,274	19 6	3,495,512	4 1	161,237	4 7
					(Increase.)	

EXPENDITURE FROM GENERAL LOAN ACCOUNT

The Loan expenditure for the year was £114,962 12s. 9d., of which £11,428 13s. 2d. was spent at Hawkesbury Agricultural College; £101,551 at Wagga Agricultural College and Experiment Station; and £1,982 19s. 7d. at Experiment Farms and Nurseries. An amount of £1,806 14s. 3d. was received from Pastures Protection Boards for instalments on rabbit destruction equipment supplied to them, the cost of which was met from General Loan Account, whilst wages overpayment of £33 4s. 3d. was recovered.

SPECIAL DEPOSITS ACCOUNT

Swine Compensation Fund

In terms of the Swine Compensation Act, 1928-1934, this Fund was established for the payment of compensation to owners of pigs destroyed and carcasses condemned in accordance with the provisions of the Act. The account is credited with moneys collected by the Commissioner of Stamp Duties in respect of swine duty, originally fixed at 1s. per head, reduced to 9d. per head from 1st March, 1935, and increased to 1s. 3d. per head on 1st October, 1945, and to 2s. per head from 1st May, 1948, on all pigs delivered for slaughter to an abattoir. Fines paid for breaches under the Swine Compensation Act, 1928-1935, are also credited to the Fund.

In the case of a pig ordered to be destroyed because it is suffering from or suspected of suffering from disease, the compensation is fixed by the Act at the full market value of the pig, less its residual value if on destruction it is found to be free from disease; and seven-eighths of the market value of the pig, less the residual value, if it is found to be diseased on destruction.

In regard to the compensation payable in respect of a condemned carcass, under the original regulations the amount of compensation was the full market value of the animal prior to slaughter, less the residual value in respect of condemned forequarters; and two-thirds of such market value, less residual value, in respect of condemned hindquarters. Under an amendment to this regulation made on 12th March, 1937, the amount of compensation for a condemned carcass was reduced to three-quarters of the market value of the pig immediately prior to slaughter, to one-quarter of such market value in the case of a condemned forequarter and to one-half the market value in respect of a condemned hindquarter. The

market value of any pig is not to be deemed for the purpose of the Act to exceed (a) if a pig is a stud pig, £20; and (b) if the pig is not a stud pig, £10. For the purposes of the regulation "stud" pig means a pig registered by the Australian Stud Pig Breeders' Society.

Prior to 31st December, 1937, compensation was payable in the case of various diseases, including Tuberculosis, Swine Fever and Anthrax. By proclamation which came into operation on 31st December, 1937, all diseases, apart from the three specifically mentioned, were excluded from the provisions of the Act. By proclamation, Brucellosis was added to these diseases in January, 1941, and Septicaemia on 15th January, 1943.

The operations on the Swine Compensation Fund for 1956-57 are summarised hereunder:—

	£	s. d.
Balance at 1st July, 1956	34,490	19 6
Receipts—Stamp Duty	52,299	11 7
	£86,790	11 1
Disbursements—	£	s. d.
Swine Compensation	30,561	17 6
Commission on Duty		
Stamps	1,168	9 5
	31,730	6 11
Balance as at 30th June, 1957	£55,060	4 2

Fund Created by the Wheat Marketing (Barring of Claims) Act, No. 22 of 1929 (as amended by Act No. 38 of 1930)

In terms of the Wheat Marketing (Barring of Claims) Act, 1929, all claims against the Government in respect of old wheat pools were barred. The State Wheat Office was closed and the funds in the hands of the State Wheat Board were paid to the Treasury. After payments of expenses incurred in financial operations, such funds were to be applied in making certain payments to the University of Sydney and to specified trustees for purposes incidental to and in connection with research work, and the balance of the moneys invested by the Colonial Treasurer in Government stock, the interest therefrom to be spent on agricultural education or research as the Minister for Agriculture may direct. Any interest unexpended at the end of the year is to be capitalised.

The only asset remaining is a debt by the Roumanian Government covered by bonds of £114,600, of which this State's share is £24,620 (less £1,108 principal repaid) approximately. There has been no payment on the bonds since 1931 and the trustees report that the prospect of any future payment seems to be negligible.

At 30th June, 1957, the Fund had assets amounting to £39,428 1s. 1d., comprising Australian Consolidated Inscribed Stock £36,860; cash in Bank £2,248 5s. 5d.; and accrued interest £319 15s. 8d. These figures are exclusive of assets in course of realisation.

No payments were made from the Fund during the year, but an amount of £1,200 was set aside to meet outstanding commitments.

The Revenue Account and Balance Sheet of the Fund for the year ended 30th June, 1957, are shown hereunder:—

REVENUE ACCOUNT FOR THE YEAR ENDED 30TH JUNE, 1957

	£	s. d.		£	s. d.
To Commitments—30th June, 1957.....	1,200	0 0	By Interest on Investments (Government Securities)	1,270	11 3
Accumulated Funds	102	11 3	Bank Interest	32	0 0
	£1,302	11 3		£1,302	11 3

BALANCE SHEET AS AT 30TH JUNE, 1957

LIABILITIES.		ASSETS.	
	£ s. d.		£ s. d.
Accumulated Funds as at 1st July, 1956	36,893 6 0	Investments in Government Securities (Face Value)	36,860 0 0
Unexpended balance of Commitments at 30th June, 1957	1,232 3 10	Balance at Commonwealth Savings Bank	2,248 5 5
Uncommitted balance of Interest on Investments at 30th June, 1957	102 11 3	Interest accrued at 30th June, 1957	319 15 8
	38,228 1 1		
Commitments to 30th June, 1957	1,200 0 0		
	£39,428 1 1		£39,428 1 1

Western Division Public Watering Places Fund

The controlling authorities of Public Watering Places in the Western Division of the State are required by section 78 (3) of the Pastures Protection Act, No. 35 of 1934, to pay to the Minister not later than 31st January in each year all moneys in their Public Watering Places funds in excess of the sum of £100. The moneys so paid to the Minister are credited to a Special Deposits Account at the Treasury called the "Western Division Public Watering Places Fund". The moneys so credited are used in the construction or maintenance of tanks, dams and other structures, machinery or works for storing or providing water or otherwise improving Public Watering Places in the Western Division.

The operations on the account during 1956-57 are shown hereunder:—

Balance as at 1st July, 1956—Nil.

Receipts—£2,148 18s. 7d.

Payments—£2,148 18s. 7d.

Balance at 30th June, 1957—Nil.

Noxious Insects Destruction Account

Section 10 (1) of the Noxious Insects Act, No. 22 of 1934 provides that such Pastures Protection Boards as are from time to time specified by proclamation published in the *Gazette* shall in each year make and levy a special rate in the amount prescribed in respect of such year on each owner or occupier of ratable land within the district in respect of large stock and sheep for which he is liable to pay rates under Part II of the Pastures Protection Act, 1912, or under any Act amending or replacing same.

Section 10 (1) of the Act was amended during 1954 by increasing the amount of the special rate which may be levied from one penny to threepence per head in the case of large stock and from one-sixth of a penny to one half-penny in the case of sheep.

The amount received in respect of rates so levied are paid by the Boards to the Minister as a contribution to the cost of suppression and destruction of noxious insects.

All contributions received by the Minister are paid into an account in Special Deposits Account at the Treasury called the "Noxious Insects Destruction Account". Moneys at the

credit of such account are applied by the Minister to the purchase of materials for the purposes of the Act and to repay to the Colonial Treasurer any moneys advanced by him.

Receipts and payments for each year since the passing of the Act in 1934 are shown hereunder:—

Financial Year	Receipts from Pastures Protection Boards	Payments
	£ s. d.	£ s. d.
1934-35.....	925 14 10	10,274 8 8
1935-36.....	1,712 1 0	731 10 10
1936-37.....	7,941 2 4	2 4 7
1937-38.....	8,707 11 11	42,161 1 11
1938-39.....	27,495 5 3	8,244 8 10
1939-40.....	17,032 2 6	5,676 16 4
1940-41.....	7,936 12 5	1,858 5 11
1941-42.....	1,169 6 3	94 16 "
1942-43.....	772 4 0	641 10 8
1943-44.....	221 1 6	1,323 16 0
1944-45.....	393 15 4	250 5 5
1945-46.....	40 17 1	48 16 8
1946-47.....	524 16 2	4,823 2 10
1947-48.....	1,913 0 6	5,534 18 6
1948-49.....	11,099 15 2	3,197 6 9
1949-50.....	664 16 3	616 13 9
1950-51.....	924 11 0	1,564 4 9
1951-52.....	46 11 5	128 16 0
1952-53.....	1 0 0	85 14 5
1953-54.....	4, 04 14 0	128,949 2 7
1954-55.....	51,588 0 3	176,497 14 8
1955-56.....	161,994 2 3	52,976 1 4
1956-57.....	142,947 18 8	25,546 17 9
	450,457 0 1	471,228 15 2
Grant by Treasury	75,000 0 0	.....
Less Sales of Materials ..	.....	2,214 3 9
		469,014 11 5
Balance in Special Deposits Account at 30th June, 1957 .....	.....	56,442 8 8
£	525,457 0 1	525,457 0 1

The following is a summary of transactions on the Noxious Insects Destruction Account for the financial year 1956-57:—

RECEIPTS	PAYMENTS
Balance as at 1st July, 1956	£ s. d.
Levies	52 1 4
Less Refunds	51 14 10
Sales of Equipment, &c.	186 7 6
	11 18 8
	82 1 6
	28 4 6
	22 7 2
	58 16 0
	Half cost of Spraying Operations in New South Wales and Victoria
	7,165 6 3
	Share of Costs of Patrol Officer
	888 0 0
	Share of Costs of Plague Locust Control Trials
	17,000 0 0
	25,546 17 9
	Repayment of Balance of Advance by Treasury ...
	75,000 0 0
	100,546 17 9
	Balance at 30th June, 1957
	56,442 8 8
£156,989 6 5	£156,989 6 5

Pastures Protection Boards of New South Wales—Subsidy to Glenfield Veterinary Research Station

The Council of Advice of the Pastures Protection Boards of New South Wales agreed in 1934 to meet the salaries and travelling expenses of two research officers in veterinary science to be attached to the Glenfield Veterinary Research Station and to defray the cost of such materials and experimental animals as may be agreed upon. The subjects of major research

on which officers are to be engaged are decided upon by the Council on the recommendation of a committee consisting of the Chief, Division of Animal Industry, and the Director of Veterinary Research.

This officer employed on this work in 1955-56 was transferred prior to the end of that year and has not been replaced. so that the only expenditure during 1956-57 was on account of the previous year.

The following is a summary of transactions on the account for the financial year 1956-57:—

RECEIPTS		PAYMENTS	
	£ s. d.		£ s. d.
Balance at 1st July, 1956	818 8 5	Payroll Tax for 1955-56	20 3 9
Workers' Compensation—Rebate on premium for 1955-56	29 15 10	Workers' Compensation Insurance Premiums ...	85 19 7
	£848 4 3	Balance at 30th June, 1957	742 0 11
			£848 4 3

Veterinary Surgeons' Act, No. 25 of 1923

The Act provides for the establishment of a Board to be called "Board of Veterinary Surgeons of New South Wales". Fees and penalties collected under the Act are paid to the credit of Consolidated Revenue Fund, from which adminis-

trative expenses are met. At 30th June, 1957, there were 385 registered Veterinary Surgeons.

Statement of Receipts and Payments for the financial year 1956-57 is shown hereunder:—

RECEIPTS.		PAYMENTS.	
	£ s. d.		£ s. d.
Registration Fees	21 0 0	Salaries	487 10 10
Restoration Fees	8 8 0	Members' Fees	40 19 0
Roll Fees	761 19 1	Travelling Expenses of Members	3 9 10
Examination Fees	73 10 0	Stationery	0 6 3
		Printing	31 19 4
		Postage	12 7 1
		Examination of Foreign Graduates—	
		Examination Fees	63 0 0
		Travelling Expenses.....	23 13 6
			86 13 6
		Excess of receipts over payments	663 5 10
	£864 17 1		201 11 3
			£864 17 1

Contribution by Milk Board Towards Cost of Herd Testing

In 1937, the Chief Veterinary Surgeon of the Department was appointed as Consulting Veterinarian to the Milk Board to supervise and control the testing of cows for tuberculosis and matters associated therewith. The Milk Board agreed to provide up to £1,250 per annum from 1st July, 1937, to meet the cost of the services to be performed by the Department. This contribution was varied from time to time in accordance with the rise and fall in the actual expenditure. From the

financial year 1952-53 the Board agreed to meet the actual cost of T.B. testing of herds, estimated at £3,315 13s. 10d., which sum was exclusive of the salaries of two office assistants attached to the Department for the carrying out of records and statistical work and whose salaries are paid direct by the Milk Board.

The operations on the account for the financial year 1956-57 are shown hereunder:—

RECEIPTS		PAYMENTS	
	£ s. d.		£ s. d.
Contributions by Milk Board—		Balance payable by Milk Board—	
For 1954-55	37 17 7	For 1954-55	37 17 7
For 1955-56	158 6 1	For 1955-56	158 6 1
For 1956-57	3,000 0 0		196 3 8
	3,196 3 8	Salaries	2,986 3 7
Balance payable by Milk Board	1,338 9 1	Employer's Superannuation Contributions	307 9 6
		Travelling Expenses.....	888 1 7
		Postage	4 0 0
		Workers' Compensation Insurance Premiums	55 17 9
			4,437 16 1
		Pay Roll Tax.....	96 16 8
	£4,534 12 9		£4,534 12 9

Potato Growers' Licensing Act

The Potato Growers' Licensing Act, 1940-1952, requires all persons who use an area of land exceeding 1 acre for the production of potatoes to obtain a licence under the Act. Application for licence or for the renewal of a licence shall be accompanied by a fee. The fee is prescribed by section 3 (2) of the Act and was increased from 10s. to £1 as from 1st December, 1952.

The licence fees collected and any penalties imposed under the Act are paid into a special account at the Treasury. The Colonial Treasurer shall upon the recommendation of the Minister for Agriculture, pay out of such special account moneys—

- to any society registered under the Co-operation Act, 1923-1938, or any other association or body of persons which, to the satisfaction of the Minister, will wholly apply such moneys to the promotion of the production, marketing, treatment and sale of potatoes.
- to be used in any other manner which the Minister deems to be best calculated to develop or protect the potato growing industry.

Any moneys so paid shall be expended for such purposes in furtherance of the interests of the potato growers of New South Wales as in any particular case the Minister may approve, or generally as may be prescribed.

The transactions of the Special Deposits Account for the financial year 1956-57 are as follows:—

RECEIPTS			PAYMENTS		
	£	s. d.		£	s. d.
Balance at 1st July, 1956	401	11 4	Grants to Potato Growers' Association	1,285	0 0
Licence Fees	1,593	1 6	Administration Costs	77	13 0
			Postage	53	11 10
			Balance at 30th June, 1957	578	8 0
	£1,994	12 10		£1,994	12 10

Grant by McGarvie Smith Institute Towards the Running Expenses of the Nutrition Station at Shannon Vale

A Nutrition Research Station was established in 1938 in the New England district for the purpose of carrying out a series of experiments associated with anaemia in sheep. The estimated working costs were £400 per annum less revenue to be received from the sale of wool. The McGarvie Smith Institute agreed to provide the difference between the amount received from the sale of wool and £400 each year for a term of five years. The first contribution of £200 was received in 1938. In July, 1943, the Institute approved of the continuance of the subsidy for a further period of five years and

from 1st January, 1946, the subsidy was increased to £600 per annum, less revenue from the sale of wool. In October, 1948, the Institute agreed that the subsidy would continue for a further period of five years. Since then no subsidy has been required, as receipts from the sale of livestock and wool, &c., have been sufficient to cover running costs.

Grants received from the Institute and the proceeds from the sale of wool are credited to a Special Deposits Account. Transactions on the account for the financial year 1956-57 are shown hereunder:—

RECEIPTS			PAYMENTS		
	£	s. d.		£	s. d.
Balance at 1st July, 1956	2,583	5 3	Wages	1,055	1 2
Sales of Livestock	689	14 1	Pay Roll Tax for 1955-56	25	5 1
Sales of Wool	3,419	2 5	New Shearing Shed	1,885	0 0
Sales of Skins	24	14 0	Fencing	91	4 4
Agistment Fees	118	5 0	Building Repairs	7	13 8
Rent	18	15 8	Freight and Cartage	152	2 2
			Plant Repairs	51	3 6
			General Supplies	1,082	12 4
				4,350	2 3
	£6,853	16 5	Balance at 30th June, 1957	2,503	14 2
				£6,853	16 5

Flood Relief

Floods during the winter months of 1956 affected the Murray River Valley, the Murrumbidgee River and the Western River systems, and resulted in 234 applications by primary producers for relief. These claims were investigated by Field Officers of the Department. The Department paid 123 claims made by householders and 106 claims for food, clothing, medical supplies and transport.

Commonwealth Dairy Industry Extension Grant

The Commonwealth Government has agreed to the continuance of the grant for a period of five years, ending 30th June, 1958, under the terms and conditions set out in the Department's report for the year ended 30th June, 1953.

The first grant was received in October, 1948, and the expenditure to 30th June, 1957, amounted to £544,442 6s. 6d. under the following headings:—

Item	1948-49 to 1955-56	1956-57	Total
	£ s. d.	£ s. d.	£ s. d.
Organising Officers	85,982 9 9	10,790 1 11	96,772 11 8
General Publicity	43,206 0 1	6,862 5 4	49,568 5 5
Demonstrations	125,227 2 7	7,892 16 9	133,119 19 4
Competitions	7,437 7 4		7,437 7 4
Field Days	88 15 7		88 15 7
Herd Recording	120,736 8 5	19,974 5 1	140,710 13 6
Artificial Insemination	60,021 14 4	54 0 11*	60,075 15 3
Statistical Work	13,352 16 9	2,588 10 10	15,941 7 7
Herd Surveys	24,230 2 2	1,935 4 6	26,165 6 8
Punch Card Equipment	863 10 11	9,570 13 8	10,434 4 7
Milking Machine Survey		2,127 19 7	2,127 19 7
Contribution towards attendance of representative at International Study Centre		400 0 0	400 0 0
Insurance of Bulls		1,600 0 0†	1,600 0 0
	£ 481,146 7 11	63,295 13 7	544,442 6 6

	£ s. d.
* Purchase of Bulls	75 0 10
Refund of Service Fees to Commonwealth	19 10 0
	94 10 10
Less Credit	40 9 11
	£54 0 11

† Includes £938 10s. 0d. balance paid to Milk Board.

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Expansion of Agricultural Advisory Services

The Commonwealth Government agreed to make grants to the States for a period of five years ending 30th June, 1957, to permit of the expansion of the Agricultural Advisory Services.

There was an unexpended balance on the Grant Account at 1st July, 1956, of £12,880 2s. 1d. Grants made by the Commonwealth for the year amounted to £70,000 and expenditure to £78,022 5s. 1d., leaving an unexpended balance of £4,857 17s. at 30th June, 1957. The expenditure to date has been as follows:—

Financial Year	Amount £ s. d.
1952-53	981 8 11
1953-54	45,303 5 9
1954-55	51,116 18 7
1955-56	69,362 4 8
1956-57	78,022 5 1
	£244,786 3 0

Rural Training of Ex-service Personnel

In view of the small number of ex-servicemen in training, the Commonwealth authorities undertook to pay sustenance and allowances as from 1st July, 1957. Payments made by this Department from grants received from the Commonwealth to finance training in 1956-57 amounted to £202 16s. 0d. only.

Argentine Ant Eradication Campaign

The campaign to eradicate the Argentine Ant was continued during 1956-57. When the campaign commenced in 1952, there were 24 areas, covering 900 acres in nine municipalities, infested. There are now 154 infested areas, covering 2,900 acres in 22 municipalities. The 130 extra infestations were probably in existence prior to 1952 and the ants have no doubt been transferred by artificial means from some or all of the original 24 areas.

The following is a statement of receipts and payments covering the costs of the campaign for the year:—

RECEIPTS			PAYMENTS		
	£	s. d.		£	s. d.
Balance as at 1st July, 1956	2,307	2 0	Wages	6,924	5 4
Consolidated Revenue Fund	2,265	0 0	Plant	10	18 0
Advances for Departmental Working Account	3,000	0 0	General Expenses	1,635	16 2
Council Contributions—	£	s. d.	Motor Vehicles—Maintenance and Operation	313	12 4
Auburn	1,355	13 2	Plant and Equipment	239	8 11
Botany	834	7 8	Stores and Supplies	2,078	7 4
Canterbury	400	13 5	Rewards	120	0 0
Drummoyle	240	13 10			
Kogarah	203	14 11		£11,322	8 1
Strathfield	132	9 6			
Sydney City	30	10 7			
Bankstown	265	2 5			
Maritime Services Board	163	7 9			
Randwick	18	15 0			
Waverley	116	18 8			
Parramatta	514	16 2			
Department of Railways	22	3 8			
Concord	18	15 0			
Manly	28	18 0			
Rockdale	573	8 5			
Blacktown	34	17 4			
Fairfield	202	5 6			
Holroyd	449	13 11			
Hornsby	23	13 3			
Hurstville	2	10 0			
Marrickville	43	10 4			
Ryde	8	17 0			
Sutherland	2	10 0			
	5,690	5 6	Balance carried forward	1,939	19 5
	£13,262	7 6		£13,262	7 6

Meat Inspection Services

The Meat Inspection Service was transferred from the Metropolitan Meat Industry Board to the Department on 1st July, 1952.

The Board meets the cost of the service rendered to the Abattoir at Homebush Bay, while the cost of the service else-

where is covered by fees prescribed by Regulation under the Meat Industry Act, 1915-1952.

The following statement shows the cost of the service, the payments made by the Metropolitan Meat Industry Board and Health Department and the revenue received from inspection fees charged under the Act for the year 1956-57:—

RECEIPTS			PAYMENTS		
	£	s. d.		£	s. d.
Homebush Abattoir—			Salaries and Wages	54,199	15 7
Payments received from Metropolitan Meat Industry Board	58,811	8 7	Retirement Leave Payments	1,187	5 0
Amount owing by Metropolitan Meat Industry Board	2,775	17 3	Workers' Compensation Insurance	1,045	3 8
			Superannuation and Endowment Fund Contributions	3,456	12 2
			Travelling Expenses	6	5 1
			Postal and Telephone	89	0 10
			Stores	133	3 4
			Stationery and Printing	109	11 3
			Advertising	5	9 1
			Pay Roll Tax	1,354	19 10
	£61,587	5 10		£61,587	5 10
Other Slaughterhouses—			Salaries and Wages	86,805	2 1
Inspection Fees—			Retirement Leave Payments	2,859	8 5
Regulation 7	55,868	19 10	Workers' Compensation Insurance	1,696	16 2
Regulation 8	18,804	13 11	Tea Money	3	15 0
Regulation 9	19,279	1 4	Endowment Fund	1,906	18 0
Regulation 10	484	3 8	Rent	119	5 6
Inspection Fees in respect of Government Institutions	400	0 0	Building Repairs	26	17 10
	94,836	18 8	Travelling Expenses	5,434	15 11
			Freight	41	4 5
			Postal and Telephone	154	13 10
			Stores	345	3 7
Excess of payments over receipts	4,640	12 5	Stationery	74	2 11
	£99,477	11 2	Gas and Electricity	9	7 6
				99,477	11 2
Employer's Superannuation Contributions and Pay Roll Tax are included in expenditure figures of the Homebush Abattoirs only.			Salaries	1,788	16 5
Knackeries—			Workers' Compensation Insurance	35	5 7
Payments by Department of Health	2,132	9 10	Endowment Fund Subsidy	70	10 2
Owing by Department of Health at 30th June, 1957	642	3 3	Travelling Expenses	398	4 0
	£2,774	13 1		£2,292	16 2
			Excess of Receipts over payments	481	16 11
				£2,774	13 1

Cattle Compensation Act, 1951-1956

This Act came into operation on 1st September, 1952. Compensation is paid in the following cases:—

- (a) Where an animal is destroyed under order of an Inspector (Stock Diseases Act, Meat Industry Act, or Cattle Slaughtering Act) because of specified diseases;
- (b) where the carcase of an animal is condemned as unfit for human consumption by any such Inspector because of such disease.

Section 9 (2) of the Act provides that 20 per cent. of the compensation payable in respect of tuberculosis during the period of three years after commencement of the Act shall be paid by the Colonial Treasurer out of moneys provided by Parliament for the purpose. Charges to the Consolidated Revenue Fund under this section ceased on 31st August, 1955.

The Cattle Compensation (Amendment) Act, 1956, was assented to on 9th November, 1956. Section 16b (1) requires every Pastures Protection Board in the year 1957 and each succeeding year to make and levy in respect of such year a special rate in respect of cattle on occupiers of land 16E, and on owners of cattle who are not occupiers of land, 16F.

On and after the first day of January, 1957, it became the duty of the person in charge of every abattoir to make and keep for a period of two years after it is made a record in the prescribed form and to make therein the prescribed entries

in respect of any cattle delivered on and after such date to such abattoir for slaughter. Any person on whose behalf any cattle are on and after the first day of January, 1957, delivered to an abattoir for slaughter shall within fourteen days after such cattle are so delivered affix to such record cattle duty stamps as prescribed by the Cattle Compensation (Taxation) Act, 1956.

Regulation 10 under the Cattle Compensation Act fixes the amount of the special rate in respect of cattle to be made and levied in pursuance of section 16b of the Act at 1s. per head. The Cattle Compensation (Taxation) Act, 1956, fixes the rate of stamp duty at 1s. per each head of cattle referred to in the entry in the register mentioned earlier.

The previous provision for the affixing of cattle duty stamps to the vendor's statement of sale operated only in respect of cattle sold up to 31st December, 1956.

In view of the change in the method of financing the compensation payable under the Act, it was necessary to obtain an advance of £15,000 from the Treasury, pending the collection of rates by Pastures Protection Boards.

During the financial year 1956-57, 6,069 claims were passed for payment covering 12,086 head of cattle. Compensation paid amounted to £215,830 6s. 5d. The following tabulation shows the various diseases for which cattle were condemned and the amount of compensation paid, together with the particulars of receipts during the year:—

Disease	Claims			Animals			Payments		
	Reg. 5	Reg. 6	Total	Reg. 5	Reg. 6	Total	Reg. 5	Reg. 6	Total
							£ s. d.	£ s. d.	£ s. d.
Tuberculosis ...	2055	1682	3737	6278	2509	8787	120,512 17 8	46,580 0 0	167,092 17 8
Cancer ...	917	115	1032	1368	120	1488	19,763 12 2	2,298 17 9	22,062 9 11
Actinomycosis ...	1180	9	1189	1430	9	1439	18,458 14 1	148 14 4	18,607 8 5
Pleuro pneumonia contagiosa ...	80	.....	80	328	.....	328	7,326 9 10	.....	7,326 9 10
Trichomoniasis ...	23	.....	23	30	.....	30	405 2 10	.....	405 2 10
Tick Fever ...	5	1	6	11	1	12	264 5 0	18 12 9	282 17 9
Johne's Disease ...	2	.....	2	2	.....	2	53 0 0	.....	53 0 0
Vibriosis ...	.....	.....	.....	.....	.....	.....	.....	.....	.....
Totals ...	4262	1807	6069	9447	2639	12086	166,784 1 7	49,046 4 10	215,830 6 5
Commission on Sale of Cattle Duty Stamps ...									2,320 7 3
Payments to Independent Valuers ...									.....
Administrative Costs ...									7,795 13 9
Total Expenditure ...									£225,946 7 5

RECEIPTS

	£	s.	d.
Brought Forward 1st July, 1956 ...	47,829	10	11
Stamp Duty ...	120,263	6	7
Levy ...	67,011	0	2
Treasury Advance ...	15,000	0	0
	202,274	6	9
	250,103	17	8
Less nett Expenditure ...	225,946	7	5
Balance carried forward 30th June, 1957 ...	£24,157	10	3

Country Killing Centres

The capital expenditure incurred by the Government on the erection of Country Killing Centres to 30th June, 1957, was as follows:—

	£	s.	d.
Goulburn	419,063	12	6
Wagga Wagga	410,061	3	4
Dubbo	464,607	0	1
Gunnedah	481,303	0	0

DEPARTMENT OF AGRICULTURE, N.S.W.

STATEMENT OF REVENUE AND RECEIPTS—CONSOLIDATED REVENUE FUND—FINANCIAL YEAR, 1956-57

Institution	Sale of Produce and Livestock, Account 5701			Students, Fees			Rents, etc., Accounts 421 and 511			Other Receipts			Gross Receipts			Receipts Returned			Nett Receipts		
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
Hawkesbury Agricultural College	27,412	3	1	30,978	18	7	6,279	3	6	1,037	3	9	65,707	8	11	558	9	4	65,148	19	7
Wagga Agricultural College and Experiment Station	10,895	6	1	9,363	6	8	6,649	17	1	616	3	0	27,524	12	10	364	3	10	27,160	9	0
Bathurst Experiment Farm	10,741	5	10	.....	.....	.....	167	14	2	10	10	2	10,919	10	2	63	0	0	10,856	10	2
Berry Artificial Stock Breeding Station	12	5	0	.....	.....	.....	.....	.....	.....	.....	.....	.....	12	5	0	.....	.....	.....	12	5	0
Condobolin Experiment Farm	4,505	19	10	.....	.....	.....	139	11	4	9	9	8	4,655	0	10	22	6	4	4,632	14	6
Cowra Experiment Farm	3,311	17	7	.....	.....	.....	130	15	0	9	14	1	3,452	6	8	8	2	10	3,444	3	10
Gosford Citrus Experiment Station	742	10	4	.....	.....	.....	154	1	6	3	18	7	900	10	5	.....	.....	.....	900	10	5
Grafton Experiment Farm	7,976	17	4	.....	.....	.....	333	0	1	167	4	11	8,477	2	4	71	6	4	8,405	16	0
Griffith Viticultural Nursery	722	1	2	.....	.....	.....	46	0	1	.....	.....	.....	768	1	3	.....	.....	.....	768	1	3
Leeton Experiment Farm	5,944	5	8	.....	.....	.....	137	3	5	27	2	4	6,108	11	5	50	4	10	6,058	6	7
Lower Murray Research Station	.....	.....	.....	.....	.....	.....	88	8	9	.....	.....	.....	88	8	9	.....	.....	.....	88	8	9
New England Experiment Farm	5,801	17	8	.....	.....	.....	610	5	8	107	16	1	6,519	19	5	9	8	4	6,510	11	1
Seven Hills Poultry Experiment Station	4,520	15	2	.....	.....	.....	182	3	4	11	17	6	4,714	16	0	1	12	6	4,713	3	6
Tamworth Agricultural Experiment Station	236	2	10	.....	.....	.....	64	18	2	.....	.....	.....	301	1	0	.....	.....	.....	301	1	0
Temora Experiment Farm	3,481	18	3	.....	.....	.....	430	0	7	137	10	0	4,049	8	10	10	12	8	4,038	16	2
Trangie Experiment Farm	18,480	11	1	.....	.....	.....	2,208	1	6	282	10	4	20,971	2	11	310	3	1	20,660	19	10
Wollongbar Experiment Farm	5,651	7	10	.....	.....	.....	482	2	1	29	16	7	6,163	6	6	12	11	10	6,150	14	8
Yanco Experiment Farm	13,053	17	2	79	16	0	2,523	4	9	32	0	10	15,688	18	9	159	7	5	15,529	11	4
	123,491	1	11	40,422	1	3	20,626	11	0	2,482	17	10	187,022	12	0	1,641	9	4	185,381	2	8
Less Receipts Returned	220	15	4	162	16	3	1,257	17	9	.....	.....	.....	1,641	9	4	.....	.....	.....	.....	.....	.....
Total	£ 123,270	6	7	40,259	5	0	19,368	13	3	2,482	17	10	185,381	2	8	1,641	9	4	185,381	2	8

Division	Particulars	Receipts (Gross)			Receipts Returned			Nett Receipts		
		£	s.	d.	£	s.	d.	£	s.	d.
Central Administration	Fees—Farm Produce Agents Act, 1926-32	315	1	0	3	0	0	312	1	0
	Fees—Fertilisers Act, 1934	201	9	0	6	6	0	195	3	0
	Fees—Apiary Registrations	2,551	8	7	18	10	3	2,532	18	4
	Fees—Pest Destroyers Act, 1945	539	1	0	34	8	0	504	13	0
	Fees—Registration of Stock Brands	1,510	0	2	26	13	6	1,483	6	8
	Fees—Registration of Swine Brands	280	3	2	8	5	6	271	17	8
	Fees—Stock Foods and Medicines Act, 1940	1,270	17	0	16	0	0	1,270	1	0
	Fees—Veterinary Surgeons Act, 1923	865	18	1	1	1	0	864	17	1
	Fees—Public Officers Witness Expenses	22	12	0	.....	.....	.....	22	12	0
	Fees—Analyses	127	12	6	.....	.....	.....	127	12	6
	Fees—Flour Certificates	848	16	0	.....	.....	.....	848	16	0
	Fines and Forfeitures	57	0	0	.....	.....	.....	57	0	0
	Forfeitures of Bonds	2,437	6	1	.....	.....	.....	2,437	6	1
	Commission for collection of Premiums—Group Assurance Scheme	653	15	5	.....	.....	.....	653	15	5
	Commission for collection of Contributions—Metropolitan Hospitals and Medical Benefits Funds	156	2	3	.....	.....	.....	156	2	3
	Commission for collection of subscriptions—Public Service Clerical and Professional Officers' Association	138	4	11	.....	.....	.....	138	4	11
	Interest on Advances from A.D.W.A.	10	2	6	.....	.....	.....	10	2	6
	Sundry Sales	55	19	8	22	19	10	32	19	10
	Sale of Government Property	7	17	6	.....	.....	.....	7	17	6
	Transfer of Part Balances not required	188	8	9	.....	.....	.....	188	8	9
	Exchange on Cheques and Remittances	208	11	7	.....	.....	.....	208	11	7
	Three Per Cent. Contribution by Pastures Protection Boards	15,332	3	1	.....	.....	.....	15,332	3	1
	Broadcasting Fees	60	16	9	47	6	7	13	10	2
	Licence Fees—Pastures Protection Act	13	10	0	1	0	0	12	10	0
	Postages	36	6	3	.....	.....	.....	36	6	3
	Television Fees	10	0	0	.....	.....	.....	10	0	0
	Employer's Liability to State Superannuation Fund	3,840	15	8	.....	.....	.....	3,840	15	8
	Administration of Cattle Compensation Fund	7,795	13	9	.....	.....	.....	7,795	13	9
	Total	39,535	12	8	170	6	8	39,365	6	0
Division of Plant Industry	Fees—Certification of Seed	7,004	19	6	2	14	0	7,002	5	6
	Fees—Certification of Bean Seed	525	2	6	4	0	0	521	2	6
	Fees—Certification of Sweet Sorghum Seed	343	2	0	2	0	0	341	2	0
	Fees—Registration of Hybrid Seed Maize	1,298	1	8	5	3	0	1,292	18	8
	Fees—Seed Testing	368	16	6	1	10	0	367	6	6
	Commonwealth Contribution towards cost of Experimental and Demonstration Work in connection with Tobacco Leaf Production	389	6	4	.....	.....	.....	389	6	4
	Commonwealth Contribution towards Administration of Plant Quarantine	1,590	13	1	.....	.....	.....	1,590	13	1
	Total	11,520	1	7	15	7	0	11,504	14	7

STATEMENT OF REVENUE AND RECEIPTS—CONSOLIDATED REVENUE FUND—FINANCIAL YEAR 1956-57—continued

Section	Particulars	Receipts (Gross)			Receipts Returned			Nett Receipts		
		£	s.	d.	£	s.	d.	£	s.	d.
Division of Horticulture	Fees—Inspection—Plant Diseases Act	18,747	1	2	0	14	2	18,746	7	0
	Fees—Fumigation—Plant Diseases Act	99	12	1	.....	.....	.....	99	12	1
	Fees—Certification of Seed Potatoes	178	14	0	2	0	0	176	14	0
	Contribution by Commonwealth Government Administration of Commerce Act	8,717	6	11	.....	.....	.....	8,717	6	11
	Contribution by Commonwealth Government Administration of Plant Quarantine	21,896	1	1	.....	.....	.....	21,896	1	1
	Rent of Premises—George Street West	1,672	2	6	.....	.....	.....	1,672	2	6
	Total	51,310	17	9	2	14	2	51,308	3	7
Division of Dairying	Fees—Grading—Dairy Industry Act	199	8	10	0	2	8	199	6	2
	Fees—Licence—Dairy Industry Act	23	0	0	.....	.....	.....	23	0	0
	Fees—Registration—Dairy Industry Act.....	11	0	0	3	0	0	8	0	0
	Fees—Dairy Science Schools.....	219	15	0	.....	.....	.....	219	15	0
	Fees—Herd Recording	34,105	18	6	22	7	0	34,083	11	6
	Commonwealth Grant towards cost of Herd Recording	19,974	5	1	.....	.....	.....	19,974	5	1
	Total	54,533	7	5	25	9	8	54,507	17	9
Division of Animal Industry— Head and District Offices.	Fees—Cattle Export	143	11	0	.....	.....	.....	143	11	0
	Fees—Brucellosis Testing of Cattle	2	18	0	.....	.....	.....	2	18	0
	Fees—Chicken Sexing Examinations	2	2	0	.....	.....	.....	2	2	0
	Fees—Honey Certificates	19	0	0	3	0	0	16	0	0
	Fees—T.B. Testing of Cattle	195	3	6	2	16	0	192	7	6
	Fees—Vaccination of Calves	9	0	0	.....	.....	.....	9	0	0
	Fees—Meat Inspection	158,803	7	2	599	5	4	158,204	1	10
	Contribution by Commonwealth Government—Administration of Animal Quarantine.....	12,359	1	5	.....	.....	.....	12,359	1	5
	Contribution by Milk Board—T.B. Testing of Herds..	3,195	13	8	.....	.....	.....	3,195	13	8
	Glenfield Veterinary Research Station—Sale of Farm Produce, etc.—	4,642	17	5	.....	.....	.....	4,642	17	5
	Telephone Calls (Private).....	22	1	8	.....	.....	.....	22	1	8
	Electricity supplied to Officers	91	10	10	.....	.....	.....	91	10	10
	Exchange on Cheques and Remittances	3	11	8	.....	.....	.....	3	11	8
	Rents	225	16	5	.....	.....	.....	225	16	5
	Total	179,715	14	9	605	1	4	179,110	13	5
Division of Animal Industry— Queensland Border Area.	Fees—Dipping Stock	7,499	16	8	.....	.....	.....	7,499	16	8
	Rents	745	19	3	5	3	7	740	15	8
	Exchange on Cheques and Remittances	7	3	5	.....	.....	.....	7	3	5
	Total	8,252	19	4	5	3	7	8,247	15	9
Division of Animal Industry— Tick Quarantine Areas.	Fees—Fumigation	59	0	2	.....	.....	.....	59	0	2
	Rents	75	6	0	.....	.....	.....	75	6	0
	Exchange on Cheques and Remittances	0	2	0	.....	.....	.....	0	2	0
	Contribution by Commonwealth in respect of Cattle Tick Eradication	675,000	0	0	.....	.....	.....	675,000	0	0
	Total	675,134	8	2	.....	.....	.....	675,134	8	2
Botanic Gardens and Allied Activities.	Rents—Exclusive of Land (Ground Fees, Kiosk Rents, etc.)	1,680	18	1	.....	.....	.....	1,680	18	1
	Lavatory Takings	157	15	3	.....	.....	.....	157	15	3
	Rents	593	3	9	.....	.....	.....	593	3	9
	Contribution by Commonwealth Government—Maintenance of Gardens at Admiralty House	9,260	1	0	1,375	2	8	7,884	18	4
	Total	11,691	18	1	1,375	2	8	10,316	15	5
Department of Agriculture	Repayments to Credit of votes—Previous Years—Hawkesbury and Wagga Agricultural Colleges and Experiment Farms.....	4,692	12	9	.....	.....	.....	4,692	12	9
	Other	20,829	16	9	0	17	3	20,828	19	6
	Total.....£	25,522	9	6	0	17	3	25,521	12	3

SUMMARY OF RECEIPTS

Particulars.	Receipts (Gross)			Receipts Returned			Nett Receipts		
	£	s.	d.	£	s.	d.	£	s.	d.
Agricultural Colleges, Farms, Stations and Nurseries	187,022	12	0	1,641	9	4	185,381	2	8
Central Administration, Divisions, etc.	1,031,694	19	9	2,199	5	1	1,029,495	14	8
Department of Agriculture—Repayments to Credit of Votes—Previous Years	25,522	9	6	17	3	.....	25,521	12	3
	£ 1,244,240	1	3	3,841	11	8	1,240,398	9	7

EXPENDITURE FROM CONSOLIDATED REVENUE FUND AND GENERAL LOAN ACCOUNT, 1956-57

(See separate statement for Expenditure from Special Deposits Account.)

Expenditure by Other Departments															
Section	Consolidated Revenue Fund					General Loan Account	Consolidated Revenue Fund.				General Loan.		Grand Total Expenditure.		
	Total						Total Expenditure by Department of Agriculture				Total Expenditure by Other Departments				
	Total						Total Expenditure by Department of Agriculture				Total Expenditure by Other Departments				
	Salaries and Payments in the nature of Salary	Maintenance and Working Expenses other than Salaries	Other Services	£	s. d.		£	s. d.	£	s. d.	£	s. d.		£	s. d.
Central Administration	474,734 5 4	44,479 11 3	31,439 8 3	550,703 4 10	.....	550,703 4 10	27,411 4 2	437 6 4	23,576 5 1	.....	86,106 16 0	636,810 0 10			
Division of Plant Industry	152,294 2 4	32,202 0 6	3,083 10 6	187,579 13 4	.....	187,579 13 4	652 5 3	2 18 5	1,646 2 0	.....	2,301 5 8	189,880 19 0			
Division of Horticulture—															
Fruit	103,424 9 9	20,851 17 5	2,282 9 0	126,558 16 2	.....	126,558 16 2	202 4 1	3 1 6	1,109 17 11	.....	1,315 3 6	127,873 19 8			
Export and Import Branch	12,610 3 6	1,908 4 9	1,950 0 0	16,168 8 3	.....	16,168 8 3	.....	.....	605 6 10	.....	605 6 10	16,773 15 1			
Plant Quarantine Service	23,003 4 6	2,360 17 2	.....	25,364 1 8	.....	25,364 1 8	.....	.....	.....	.....	.....	25,364 1 8			
Division of Dairying—															
General	66,620 2 5	14,836 5 8	100 0 0	81,556 8 1	.....	81,556 8 1	117 6 8	.....	538 16 11	.....	656 3 7	82,212 11 8			
Herd Recording	63,220 16 6	19,913 12 7	10,451 0 3	93,584 9 1	.....	93,584 9 1	.....	.....	.....	.....	.....	93,584 9 1			
Hawkesbury Agricultural College	107,684 2 5	51,444 10 5	5,783 10 5	164,911 8 3	11,428 13 2	181,008 6 3	927 4 6	2,931 18 5	5,051 5 0	.....	8,240 7 11	189,248 14 2			
Wagga Agricultural College	51,980 3 11	22,216 0 1	.....	74,196 3 12	101,551 0 0	181,550 15 3	311 11 7	321 2 0	1,047 12 4	.....	1,880 5 11	183,431 1 2			
Astonville Tropical Fruit Research Station	10,924 9 6	6,164 17 8	405 5 4	17,495 15 6	.....	17,495 15 6	.....	.....	.....	.....	.....	17,495 15 6			
Bathurst Experiment Farm	13,092 13 2	8,654 6 2	3,928 12 6	25,673 8 2	.....	25,673 8 2	22 14 7	284 18 4	536 16 9	.....	844 9 8	26,597 5 5			
Cowra Experiment Farm	7,963 1 10	4,564 12 6	1,563 3 3	14,091 3 7	.....	14,091 3 7	17 13 5	26 9 5	87 8 8	.....	105 1 9	14,242 9 11			
Condon Experiment Farm	13,895 13 2	2,586 12 6	502 15 4	16,983 6 3	.....	16,983 6 3	12 14 5	26 9 5	56 8 7	.....	69 3 0	17,054 9 3			
Geelong Girrus Research Station	26,236 12 1	8,037 2 3	515 3 7	34,788 17 11	.....	34,788 17 11	11 17 6	29 8 0	466 9 11	.....	507 15 5	35,296 13 4			
Griffith Experiment Farm	3,734 16 8	543 10 5	35 13 3	4,314 0 4	.....	4,314 0 4	.....	.....	.....	.....	.....	4,314 0 4			
Griffith Viticultural Nursery	13,046 18 4	6,983 0 5	5,594 9 1	25,624 7 10	.....	25,624 7 10	9 3 3	83 7 0	412 2 9	.....	504 13 0	31,146 8 10			
Leeton Experiment Farm	898 4 1	1,217 19 3	434 2 2	2,550 5 6	37 0 0	2,587 5 6	.....	.....	.....	.....	.....	2,587 5 6			
Lower Murray Research Station	21,708 9 3	5,281 1 7	1,080 17 10	28,070 8 8	.....	28,070 8 8	61 12 7	278 8 0	280 15 4	.....	559 3 4	28,629 12 10			
New England Experiment Farm	14,137 7 2	3,729 7 1	374 15 5	18,241 9 8	.....	18,241 9 8	8 6 1	58 18 10	504 16 9	.....	443 2 0	18,745 11 4			
Seven Hills Poultry Experiment Station	3,702 16 0	4,579 17 4	451 8 6	8,734 1 10	980 6 5	9,714 8 3	.....	.....	45 5 0	.....	45 5 0	9,759 13 3			
Tamworth Agricultural Research Station	10,722 17 4	4,025 1 5	814 5 2	15,562 3 11	.....	15,562 3 11	14 5 3	105 13 8	185 1 0	.....	304 19 11	16,867 8 18			
Temora Experiment Farm	20,543 16 5	14,432 4 5	1,961 1 1	35,937 1 11	965 13 2	36,902 15 1	58 15 3	44 0 0	1,801 18 4	.....	1,860 13 7	38,768 5 10			
Trangie Agricultural Experiment Station	15,698 11 0	5,092 6 7	1,481 4 10	22,272 2 5	.....	22,272 2 5	6 6 1	.....	240 17 4	.....	246 7 5	22,518 9 10			
Wollongbar Experiment Farm	33,279 7 10	14,188 13 8	2,550 0 0	49,917 8 7	.....	49,917 8 7	35 18 11	283 0 6	1,115 5 0	.....	1,434 4 5	50,310 13 0			
Yanco Experiment Farm	.....	.....	2,550 0 0	2,550 0 0	.....	2,550 0 0	.....	.....	.....	.....	.....	2,550 0 0			
Tobacco Research	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....			
Division of Animal Industry—															
Head and District Offices	116,967 3 1	25,441 12 3	4,718 1 0	146,496 16 4	.....	146,496 16 4	309 18 1	2 18 5	1,194 8 2	.....	1,507 4 8	147,994 1 0			
Glenfield Veterinary Research Station	42,537 12 5	10,474 6 6	1,408 13 8	54,218 12 7	.....	54,218 12 7	.....	.....	1,129 8 10	.....	1,415 0 10	55,633 13 5			
Shannon Vale	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....			
Meat Inspection Service—															
Hobart	55,387 0 7	2,546 1 5	.....	57,933 2 0	.....	57,933 2 0	.....	.....	.....	.....	.....	57,933 2 0			
Other Abattoirs	89,694 10 6	9,813 0 8	.....	99,477 11 2	.....	99,477 11 2	.....	.....	.....	.....	.....	99,477 11 2			
Knackeries	1,788 16 5	503 19 9	.....	2,292 16 2	.....	2,292 16 2	.....	.....	.....	.....	.....	2,292 16 2			
Animal Quarantine Service	10,617 19 10	1,340 18 7	.....	11,958 18 5	.....	11,958 18 5	.....	.....	.....	.....	.....	11,958 18 5			
Queensland Border Control	42,815 13 7	15,016 16 2	280 15 9	58,113 5 6	.....	58,113 5 6	.....	.....	.....	.....	.....	58,113 5 6			
Tick Quarantine Areas	680,533 7 2	328,496 13 11	190,277 14 7	1,199,307 15 8	.....	1,199,307 15 8	.....	.....	.....	.....	.....	1,199,307 15 8			
Botanic Gardens and Allied Activities—															
Botanic Gardens	72,394 3 9	5,622 2 7	796 5 2	78,812 11 6	.....	78,812 11 6	239 0 3	342 0 0	455 11 6	.....	1,066 11 9	79,879 3 3			
Government Domain	8,732 19 7	722 13 4	.....	9,455 12 8	.....	9,455 12 8	.....	.....	.....	.....	.....	9,455 12 8			
Centennial Park	17,455 4 5	1,384 14 4	852 3 0	19,692 1 9	.....	19,692 1 9	.....	.....	88 15 9	.....	52 6 2	19,885 17 6			
Totals	2,403,191 15 10	701,454 13 6	275,873 2 0	3,380,549 11 4	114,962 12 9	3,495,512 4 1	32,164 13 10	30,430 13 7	42,786 19 9	2,517 6 7	113,071 13 7	3,608,583 17 8			
(1) Being Expenditure on—					£	s.	d.	(2) Being Expenditure on—					£	s.	d.
Stores, Stationery, Furniture, etc.					.....	.....	.....	Gas and Electricity					.....	.....	.....
Cleaning Services					.....	.....	.....	Maintenance of Buildings					.....	.....	.....
					.....	.....	.....	Telephone Services					.....	.....	.....
															
															
															
															
															
															
															
															
															
															
															
															
															
															
															
															
															
															
															
															
															
															
															
															
															
															
															
															
															
															
															
															
															
															
															
															
															
															
															
															
															
															
															
															
															
															
															
															
															

(1) Being Expenditure on—

Stores, Stationery, Furniture, etc.

Cleaning Services

£ s. d.

10,954 19 4

21,209 14 6

£32,164 13 10

(2) Being Expenditure on—

Gas and Electricity

Maintenance of Buildings

Telephone Services

£ s. d.

16,786 13 2

13,560 2 3

12,410 4 4

£42,756 19 9

Expenditure Figures not available from Premier's Department.

OTHER ACCOUNTS

Name of Account	Balance as at 1st July, 1956	Receipts 1956-57	Payments 1956-57	Balance as at 30th June, 1957
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Advances to Officers for Purchase of Motor Cars	<i>Dr.</i> 98,060 10 11	28,216 2 9	23,632 5 2	<i>Dr.</i> 93,476 13 4
Contribution towards Running Expenses of Tractor Mower at Centennial Park	409 17 9	168 6 8	231 6 2	346 18 3*
Potato Growers' Licensing Act, 1940	401 11 4	1,593 11 6	1,416 14 10	578 8 0*
Construction, Maintenance and Improvement of Public Watering Places in the Western Division		2,148 18 7	2,148 18 7	0 0*
Balance of Salaries Adjustment Suspense Account	40,079 17 10	43,439 6 1	40,079 17 10	43,439 6 1*
Government Printing Office—Working Account and Stores Account and Sale of Publications		696 11 5	31 18 9	664 12 8*
Noxious Insects Destruction Account	13,694 5 10	143,422 19 2	100,674 16 4	56,442 8 8*
Swine Compensation Fund	34,490 19 6	52,299 11 7	31,730 6 11	55,060 4 2*
Purchase of Milk and Cream—Hawkesbury Agricultural College	7,039 0 4		7,039 0 4	0 0*
Hawkesbury Agricultural College Canning Factory Account	942 11 6	773 16 3	1,509 1 8	207 6 1*
Hawkesbury Agricultural College—Dairying Factory Working Account	2,710 4 10	96,447 9 6	93,953 16 6	5,203 17 10*
Tobacco Industry Trust Account		15,224 17 4	4,964 4 7	10,260 12 9*
Unclaimed Moneys Account	568 8 0	496 16 1	301 9 1	763 15 0*
Rural Training of Ex-Servicemen	549 11 2		202 16 0	346 15 2*
Commonwealth Grant towards the Promotion of Improved Practices in the Dairying Industry	12,337 10 1	67,073 19 8	63,298 16 10	16,112 12 11*
Argentine Ant Eradication Campaign	2,307 2 0	10,955 5 6	11,322 8 1	1,939 19 5*
Commonwealth Grant—Expansion of Agricultural Advisory Services—New South Wales	12,880 2 1	70,067 10 0	78,089 15 1	4,857 17 0*
Cattle Compensation Fund	47,829 10 11	202,274 6 9	225,946 7 5	24,157 10 3*
Flood Relief Scheme, 1955	49,944 12 3	33,213 15 0	63,664 18 0	19,493 9 3*
Flood Relief Scheme, 1955—Proceeds of Appeals and Contributions forwarded to the Government of New South Wales for Relief of Flood Victims	2,353 16 7	5 0 0	2,358 16 7	0 0*
Hawkesbury Agricultural College Trust Account	<i>Dr.</i> 224 2 2	9,610 2 9	7,907 8 0	1,478 12 7*
Wagga Agricultural College Trust Account	1,082 1 0	1,497 5 6	1,399 5 1	1,180 1 5*
Advertising—Department of Agriculture Publications Account	1,031 10 4	9,718 10 5	9,554 12 6	1,195 8 3*
Attendance at International Agricultural Study Centre, Wageningen, Holland—H. Parry Brown		1,400 0 0	764 13 0	635 7 0*
Bequest from Estate of Emanuel Haropoulous for the purpose of Agricultural Research		1,595 7 1	1,325 4 5	270 2 8*
V. P. Bragg Agricultural Scholarship—Wagga		100 0 0	100 0 0	0 0*
Chicken Sexing—Purchasing of Chickens	13 0 0	52 0 0	65 0 0	0 0*
Commonwealth Bank (Rural Credits Development Fund) Grant towards Erection of Glasshouse, Hawkesbury Agricultural College	2 7 4			2 7 4*
Contribution by C.S.I.R.O. towards Construction of Animal House at Trangie	5,500 0 0			5,500 0 0*
Contribution by C.S.I.R.O. towards Ecto-Parasite Survey	3,204 9 0		2,928 18 3	275 10 9*
Contribution by C.S.I.R.O. towards Fleece Testing work at Trangie	1,000 0 0			1,000 0 0*
Contribution by C.S.I.R.O. towards Cost of Research into Metabolic Diseases of Sheep and Endocrinology—Glenfield Veterinary Research Station	711 1 5	818 13 10	1,529 15 3	0 0*
Contribution by Council of Advice to Pastures Protection Boards towards cost of attendance by Mr. E. McBarron at Grasslands Conference, New Zealand		260 0 0	229 11 3	30 8 9*
Contribution by Department of Commerce and Agriculture towards Development of Auto-Stripper	484 11 5		2 0 1	482 11 4*
Contribution by Legume Inoculant Association towards Research and Service in the Field of Rhizobiology		200 0 0	118 16 0	81 4 0*
Contributions by States towards Salary and Expenses of Patrol Officer, Grasshopper Control	2,417 2 5	2,220 0 0	1,304 5 5	3,332 17 0*
Contribution towards Animal Insect Pest Investigations—Glenfield		550 0 0		550 0 0*
Contributions for Plague Locust Trial Control Campaign		20,477 5 5		20,477 5 5*
Contributions towards cost of Miss A. Myers' trip abroad, 1956	1,470 0 0		1,398 10 7	71 9 5*
Contribution towards cost of N. M. Foskett's attendance at Associated Country Women Conference (Ceylon)	550 0 0		550 0 0	0 0*
Contribution towards cost of attendance of Departmental Delegates to New Zealand Grasslands Conference	750 0 0		742 1 5	7 18 7*
Contributions towards Establishment of Library at Agricultural Research Institute, Wagga	45 9 7			45 9 7*
Department of Agriculture Suspense Account	4,493 19 8	15,931 9 6	15,856 12 9	4,568 16 5*
Donation by I.C.I.A.N.Z. towards Pasture Fertilizer Nitrogen Investigations		3,500 0 0	2,321 17 7	1,178 2 5*
Fire Damage Account	5,985 13 8	1,678 8 7	6,241 7 11	1,422 14 4*
Hawkesbury Agricultural College Egg Laying Competition Prize Fund	421 13 4	311 5 6	246 7 0	486 11 10*
Horse Breeding Fund	142 18 10			142 18 10*
Interstate Meat Co. Pty. Ltd.—Bursary—Wagga	3 10		3 10	0 0*
Leeton Machinery Pool Hire Charges Account		16 9 6	16 9 6	0 0*
McGarvie Smith Institute—Contribution towards Running Expenses of Nutritional Station at Glen Innes	2,583 5 3	4,339 5 4	4,418 16 5	2,503 14 2*
McGarvie Smith Institute—Contribution to Nutritional Research Laboratory, Glenfield	697 7 11		10 8 4	686 19 7*
Pastures Protection Boards of New South Wales—Subsidy to Glenfield Veterinary Research Station	818 8 5	29 15 10	106 3 4	742 0 11*
W. S. Pender Memorial Fund—Interest on Bonds	196 2 9	31 5 0	23 2 6	204 5 3*
Rice Research Laboratory, Yanco	2,000 0 0		1,893 5 4	106 14 8*

OTHER ACCOUNTS—continued

Name of Account	Balance as at 1st July, 1956	Receipts 1956-57	Payments 1956-57	Balance as at 30th June, 1957
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Sale of Book "Farm Management and Elementary Agricultural Economics".....	8 11	.....	.....	8 11*
Sale of Photographic Prints	3 1 4	6 15 0	5 15 0	4 1 4*
Sale of Rural Training Booklets—Wagga	1 19 7	.....	.....	1 19 7*
Stamp Duty on Agreement—Wheat Stacking Sites	15 0	.....	.....	15 0*
Tropical Fruit Research Station	5,000 0 0	.....	.....	5,000 0 0*
Unclaimed Salaries and Wages	729 10 9	871 16 4	867 17 10	733 9 3*
Total	£ 171,591 10 8	843,733 19 5	814,526 3 4	200,799 6 9

APPENDIX II

Published Matter,* 1956-57

*Viz: Matter printed as Department of Agriculture (D. of A.) booklets, or contributed to and printed as articles in Department of Agriculture journals (the monthly Agricultural Gazette of N.S.W., the quarterly Review of Marketing and Agricultural Economics, the bi-monthly Herd Recorders' Letter or Dairy Topics) or the journals of other institutions, organisations.

The Appendix does not list the many times greater volume of items contributed, in the course of extension service, to such media as the Department's weekly printed broadsheet Press Copy, and regional publicity bulletins (processed), for syndication to newspapers (and radio stations). A statistical account of that published matter is included in this Report under "Division of Information and Extension Services—Editorial Section—Regional Publicity—" and "M.I.A. Agricultural Service".

A. DIVISION OF PLANT INDUSTRY

D. of A. Booklets

- Adams, T.—Pastures for West Wyalong District. 41 pp., ill.
 Ament, B. D.—Fodder Crops for Orange-Bathurst-Molong District. 23 pp., ill.
 Ballard, J. H.—Pastures for Wagga Wagga District. 47 pp., ill.
 Filan, F.—Fodder Crops for Mudgee-Coonabarabran District. 9 pp., ill.
 Filan, F.—Pastures for Mudgee District. 43 pp., ill.
 Godden, G. R.—Pastures for Berrigan District. 65 pp., ill.
 Johnson, R. I.—Fodder Crops for Junee District. 12 pp., ill.
 McDqnald, M. A. K.—Pastures for Kiama District. 45 pp., ill.
 Nicholson, F. J.—Fodder Crops for Tumut-Tumbarumba District. 23 pp., ill.
 Nicholson, F. J.—Pastures for Tumut District. 49 pp., ill.
 Thompson, R.—Fodder Crops for Goulburn-Yass District. 12 pp., ill.
 Wallin, D. E.—Fodder Crops for Griffith District. 12 pp., ill.
 Woodward, H. A. W.—Fodder Crops for Parkes-Forbes District. 8 pp., ill.

Contributions to Journals

- Anon.—An Aid to Mower Maintenance. Agric. Gaz. N.S.W. 68: 132-4.
 Anon.—Approved Vegetable Seed. Agric. Gaz. N.S.W. 68: 81.
 Anon.—Asparagus Culture. Agric. Gaz. N.S.W. 67: 565-7.
 Anon.—Autumn in the Flower Garden. Agric. Gaz. N.S.W. 68: 125-8.
 Anon.—Baled Pit Silage on the Coast. Agric. Gaz. N.S.W. 68: 160.
 Anon.—Broad Beans. Agric. Gaz. N.S.W. 68: 154.

Anon.—Cereal Growing with New Farm Programme. Land Inspector 1956.

Anon.—Cereal Seed Treatments. Agric. Gaz. N.S.W. 68: 38-40.

Anon.—Certified Pasture Seed. N.S.W., 1956-57. Agric. Gaz. N.S.W. 68: 216-7.

Anon.—Certified Sub. Clover Seed. 1956-57. Agric. Gaz. N.S.W. 68: 157-9.

Anon.—For Spring Sowing of Vegetables. Agric. Gaz. N.S.W. 67: 464-9.

Anon.—For Summer Sowing of Vegetables. Agric. Gaz. N.S.W. 67: 639-44.

Anon.—Home Garden Guide—Autumn Sowing of Vegetables. Agric. Gaz. N.S.W. 68: 122-5.

Anon.—Home Garden Guide—For Winter Sowing of Vegetables. Agric. Gaz. N.S.W. 68: 249-54.

Anon.—Land Preparation—Spring Sowing of Vegetables. Agric. Gaz. N.S.W. 67: 464-9.

Anon.—New Plant Diseases. Agric. Gaz. N.S.W. 68: 41-3.

Anon.—Red Clover Control of Serrated Tussock. Agric. Gaz. N.S.W. 68: 308.

Anon.—Spring in the Flower Garden. Agric. Gaz. N.S.W. 67: 464-9.

Anon.—Summer in the Flower Garden. Agric. Gaz. N.S.W. 67: 639-44.

Anon.—Winter in the Flower Garden. Agric. Gaz. N.S.W. 68: 254-6.

Atkinson, J. A.—Servicing the Flood Damaged Tractor. Agric. Gaz. N.S.W. 67: 575-6.

Atkinson, J. A.—South Coast Farmer Invents a "Multi-Cultivator". Agric. Gaz. N.S.W. 68: 44-6.

Boyle, J. W.—Farm Subdivision is Important. Agric. Gaz. N.S.W. 68: 309-10.

Boyle, J. W.—Three Million Acres of New Pastures in Four Years. Agric. Gaz. N.S.W. 68: 135-6.

Boyle, J. W.—The Urgency and Importance of Soil Conservation. Agric. Gaz. N.S.W. 68: 236-9.

Brown, C. Walkden.—Limitations of Early Blackhull. Agric. Gaz. N.S.W. 68: 261.

Brown, C. Walkden.—Oat Varieties for 1957. Agric. Gaz. N.S.W. 68: 9-13.

Brown, C. Walkden.—Wheat Varieties for 1957. Agric. Gaz. N.S.W. 68: 58-67.

Carter, D. G., and Jenkins, H. V.—Vetches as a Spring Fodder Crop. Agric. Gaz. N.S.W. 67: 568-9.

Godden, C. R.—Dorset Horns and Spray Irrigation. Agric. Gaz. N.S.W. 67: 562-4.

Godden, G. R.—The Making of Better Hay. Agric. Gaz. N.S.W. 67: 402-7.

Gottl, R., and Darley, E. C.—Greater Yields and Earlier Fruit from Hybrid Tomatoes. Agric. Gaz. N.S.W. 67: 629-33. See also H.A.C., Gottl, R.

Hartridge, F. S., Pulsford, J., and Davison, J. W.—Strip Grazing of Pastures. Agric. Gaz. N.S.W. 67: 348-52; 418-21.

Hudson, W. J., Moraghan, J. T., Marshall, K. C., and Cradock, F. W.—Pasture Establishment on Sandstone Soils. Agric. Gaz. N.S.W. 68: 179-82. See Biological Branch, Marshall, K. C., Chemist Branch, Cradock, F. W., and H.A.C., Moraghan, J. T.

Kavanagh, L. R.—The Sowing of Hybrid Maize, 1956-57. Agric. Gaz. N.S.W. 67: 360-5.

Macindoe, Dr. S. L.—Wheat Farming Developments in Australia. *World Crops*, vol. 8: No. 11, Nov., 1956.

Moraghan, J. T., and Grimmett, S. G.—Fertilizer requirements and Pasture Improvements of Soils Derived from Wianamatta Shale. *Agric. Gaz. N.S.W.* 68: 98. See also H.A.C., Moraghan, J. T.

Moraghan, J. T., and Cradock, F. W.—Phosphorus, Sulphur and Molybdenum Responses on a Sandstone Soil from Running Stream. *Agric. Gaz. N.S.W.* 67: 573-4. See also H.A.C., Moraghan, J. T., and Chemist Branch, Cradock, F. W.

Peterson, S.—Sunflower Growing in N.S.W. *Agric. Gaz. N.S.W.* 68: 27-30.

Simmons, K. V.—Establishment of Legumes Sown with Rice. *Agric. Gaz. N.S.W.* 68: 198-9.

Strang, J., and Wilson, G.—Nodulation of Clare Subterranean Clover in Relation to Acid and Basic Superphosphate Placement. Technical Note in *J. Aust. Inst. Agric. Sci.*, vol. 22, No. 4, Dec., 1956.

Sykes, S. M., and Tinsley, I. J.—Preservation of Brassicas by Freezing. *Agric. Gaz. N.S.W.* 67: 381-3.

Tindale, E.—Farming in the Skeleton Weed Areas of the Wagga Wagga District. *Agric. Gaz. N.S.W.* 67: 653-7.

Walker, M. H., and Atkinson, W. T.—Topdressing Lucerne on a New England Basaltic Soil. *Agric. Gaz. N.S.W.* 68: 226-35.

Wallin, D. E.—Establishing Paspalum in Irrigated Pastures. *Agric. Gaz. N.S.W.* 68: 294-7.

Weir, R. G., Marshall, K. C., and Atkinson, W. T.—Plant Nutrition on Show. *Agric. Gaz. N.S.W.* 67: 491-3. See also Chemist Branch, Weir, R. G., and Biological Branch, Marshall, K. C.

B. DIVISION OF HORTICULTURE

D. of A. Booklets

Bowman, F. T.—Horticultural Research Record No. 1. 63 pp.

Contributions to Journals

Anon.—Australian Tropical Fruits—Their Nutritive Value. *Agric. Gaz. N.S.W.* 68: 194-7.

Bryden, J. D., and Johnson, J. F.—Berries and Bush Fruits. *Agric. Gaz. N.S.W.* 68: 305-7, 330.

Bryden, J. D.—Use of Plastic Ties in Fruit Tree Budding. *Agric. Gaz. N.S.W.* 68: 87-8.

Cann, H. J.—The Packing of Bananas. *Agric. Gaz. N.S.W.* 67: 408-12, 470-81.

Leggo, D.—Mould Wastage in Citrus. Prompt Treatment is Essential for Best Control. *Agric. Gaz. N.S.W.* 68: 89-90.

Levitt, E. C.—Citrus Growers should be Salesmen. *Agric. Gaz. N.S.W.* 68: 189.

McGrath, J. V.—Apple Growing in Early Districts. *Agric. Gaz. N.S.W.* 68: 284-8.

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